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Foreword

The UNITED STATES ARMED FORCES MEDICAL JOURNAL represents the unification of the BULLETIN OF THE UNITED STATES ARMY MEDICAL DEPARTMENT and the UNITED STATES NAVAL MEDICAL BULLETIN. This joint periodical is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense.

The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

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The summary should be a factual and brief recapitulation of the observations or statements contained in the article. The conclusions drawn from the case, experiment, or facts set forth should be clearly stated and should appear at the close.

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OFFICE OF THE SECRETARY OF DEFENSE
ARMED FORCES MEDICAL POLICY COUNCIL
WASHINGTON 25, D. C.

MEMO: Personnel of the Medical Services of the United States Armed Forces

Perhaps in no other field are medical concepts changing more rapidly than in that associated with atomic, bacteriologic, biologic, and chemical warfare. The Armed Forces Medical Policy Council is keenly aware of its responsibility to keep the medical officer informed of the medical and defensive aspects of these new types of warfare as they are developed. Because of the experimental and, in some instances, the highly classified nature of these types of warfare, the information contained in instructional manuals cannot be complete, but even limited information can be of inestimable value.

Working with representatives of the Army, Navy, and Air Force research departments, the Research and Development Board in the Office of the Secretary of Defense, the Atomic Energy Commission, and other related offices, the Council is undertaking the task of keeping medical officers informed in this regard. Two manuals for use by the three services have been recently published: "The Handbook of Atomic Weapons for Medical Officers" and "The Treatment of Chemical Warfare Casualties." A third, dealing with radiologic hazards, as well as one on the medical aspects of biologic warfare, are being prepared. It is the further intent of the Council to keep the medical officers informed as additional data on these subjects become available or when substantial changes in the general situation occur.

W. Randolph Lovelace, II, M. D.
Chairman

Treatment of Salmonella Infections With Chloramphenicol and Terramycin

Lorenz E. Zimmerman, *Lieutenant Colonel, MC, U. S. A.* (1)

SALMONELLA infections are classified as (2):

1. Salmonella gastroenteritis, the food-poisoning group, which is generally a self-limited disease rarely lasting longer than 1 week. Blood cultures are usually negative. Except in infants there is no significant mortality. The other 2 groups are more serious diseases with a much less favorable prognosis.

2. Salmonella fever which includes the typhoid-paratyphoid group in which there is an insidious onset, a prolonged febrile course, and leukopenia. *S. typhosa* and *S. schottmülleri* are the usual etiologic agents in the United States and Europe (3-10). Although *S. paratyphi*

(1) At Mobile Medical Laboratory, 8217th Army Unit, Pusan, Korea, at time of writing this article; now with Armed Forces Institute of Pathology, Washington, D. C.

(2) Bornstein, S.: State of salmonella problem. J. Immunol. 46: 439-496, June 1943.

(3) Seligmann, E.; Saphra, I.; and Wassermann, M.: Salmonella infections in man; analysis of 1,000 cases bacteriologically identified by New York Salmonella Center. Am. J. Hyg. 38: 226-249, Nov. 1943.

(4) Seligmann, E.; Saphra, I.; and Wassermann, M.: Salmonella infections in U. S. A.; second series of 2,000 human infections recorded by N. Y. Salmonella Center. J. Immunol. 54: 69-87, Sept. 1946.

(5) Edwards, P. R., and Bruner, D. W.: Occurrence and distribution of salmonella types in United States. J. Infect Dis. 72: 58-67, Jan.-Feb. 1943.

(6) Feemster, R. F., and Anderson, G. W.: Paratyphoid fever in Massachusetts. Am. J. Pub. Health 29: 881-888, Aug. 1939.

(7) Scott, W. M.: Control of common fevers; enteric fevers. Lancet 1: 389-393, Mar. 22, 1941.

(8) Glass, V., and Wright, H. D.: Isolation of Bact. paratyphosum B from excreta of patients suffering from paratyphoid fever. J. Path. & Bact. 45: 431-439, Sept. 1937.

(9) Gell, P. G. H., and Knox, R.: Duration of infectivity with Bact. paratyphosum B. Pub. Health London 56: 8-10, Oct. 1942.

(10) Bruner, D. W., and Joyce, B. J.: Salmonella types encountered by 15th Medical General Laboratory. Am. J. Hyg. 45: 19-24, Jan. 1947.

has been infrequently encountered in occidental countries (3-7, 10) it is a rather common cause of salmonella fever in the Orient where it may be more often isolated than *S. typhosa* (11-13).

3. Salmonella septicemia is a more fulminating infection with an abrupt onset, high spiking fever, leukocytosis, frequent pyemic complications such as lobar pneumonia, lung abscess, empyema, endocarditis, and meningitis, and a high fatality rate. *Salmonellas* of somatic group C, particularly *S. choleraesuis*, are the most frequently reported causes of this syndrome (4, 14-19).

To the above clinical types of salmonella infections we may properly add the subclinical carrier state. Although not a therapeutic problem in the clinical sense, carriers are most important epidemiologic cases, particularly to troops in the field. From the standpoint of preventive medicine, a drug that will eradicate the carrier state is as necessary as one that will cure the active disease.

Heretofore there has been no satisfactory treatment for salmonella fever, salmonella septicemia, or salmonella carriers. Immune serums, bacteriophage, sulfonamides, penicillin, and streptomycin have all been used but with disappointing or equivocal results. During the 6-month period between March and September 1951, 7 patients with salmonella infections were treated with one or more of the newer antibiotics. In each instance there was prompt clinical and bacteriologic response. Because of the uniformly good results obtained with chloramphenicol and terramycin it was thought worthwhile to report these cases.

CASE REPORTS

Case 1. A 24-year-old soldier was first seen on the isolation ward of the 3d Station Hospital on 26 April 1951, where he had been transferred because of a proteus OX-19 titer of 1:160. He had been admitted

(11) Barksdale, W. L.: Annual Historical Report, 406th Medical General Laboratory, Tokyo, Japan, 1948. p. 75.

(12) Syverton, J. T.; Ching, R. E.; Cheever, F. S.; and Smith, A. B.: Typhoid and paratyphoid A in immunized military personnel. J. A. M. A. 131: 507-514, June 8, 1946.

(13) Zimmerman, L. E.; Cooper, M.; and Graber, C. D.: Bacteriologic study of salmonellosis in Korea with special reference to S. paratyphi. To be published.

(14) Boycott, J., and McNee, J. W.: Human infection with American hog-cholera bacillus; third example in England. Lancet 2: 741-742, Sept. 26, 1936.

(15) Harvey, A. M.: Salmonella suipestifer infection in human beings; review of literature and report of 21 new cases. Arch. Int. Med. 59: 118-135, Jan. 1937.

(16) Read, C. T.: Endocarditis caused by salmonella suipestifer. J. Infect. Dis. 65: 263-266, Nov.-Dec. 1939.

(17) Goulder, N. E.; Kingsland, M. F.; and Janeway, C. A.: Salmonella suipestifer infection in Boston; report of 11 cases, with autopsy findings in case of bacterial endocarditis due to this organism, and study of agglutination reactions in this infection. New England J. Med. 226: 127-138, Jan. 22, 1942.

(18) Schwabacher, H.; Taylor, J.; and White, M. H. G.: Human infection with Bact. choleraesuis; report of 2 cases. Brit. M. J. 2: 358-359, Sept. 18, 1943.

(19) Jager, B. V., and Lamb, M. F.: Sporadic infections caused by Salmonella suipestifer and Salmonella oranienburg. New England J. Med. 228: 299-305, Mar. 11, 1943.

to the hospital on 16 April because of a fever of undetermined origin. About a month prior to admission he had a watery diarrhea. Two weeks later he developed a low-grade fever, headache, nausea, vomiting, and a foul taste. Routine studies on admission, including stool cultures, examination for ova and parasites, blood counts, urinalysis, urine culture, and a roentgenogram of the chest revealed no abnormalities.

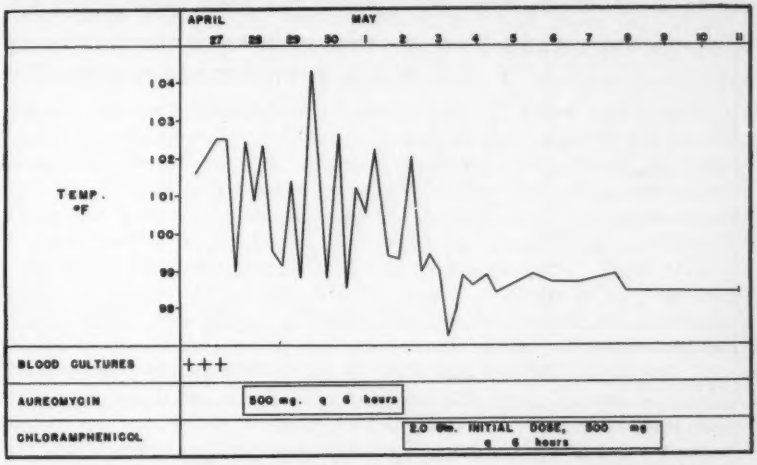

Figure 1 (case 1). Salmonella fever due to S. paratyphi.

On arrival at the isolation ward the patient was constipated and still had a low-grade fever. Physical examination was negative except for fever and a palpable spleen. On 27 April, 3 blood cultures were obtained at 4-hour intervals. *S. paratyphi* was recovered from all 3, but the results of culture were not available until 2 May. Meanwhile, on 28 April, aureomycin therapy was started on the assumption the patient had typhus. He was given 0.5 gram every 6 hours. Widal, Weil-Felix, and heterophile antigen tests on 28 April were all negative. Because there had been no response to aureomycin and the Weil-Felix was negative, the presumptive diagnosis of typhus was abandoned.

When the results of blood culture were available on 2 May, aureomycin was discontinued and chloramphenicol started. He was given an initial dose of 2 grams followed by 0.5 gram every 6 hours until 9 May. There was an immediate clinical response (fig. 1) and from 3 May until his discharge to duty on 11 May, the patient remained afebrile.

Comment. This patient had had a prolonged febrile disease due to *S. paratyphi* which was promptly brought under control by chloramphenicol. During the 4 days of aureomycin therapy daily fever spiking to over 102° F. occurred each afternoon. The patient was discharged to full duty 9 days after treatment with chloramphenicol was started.

Case 2. A Puerto Rican soldier from the stockade was seen on 7 June 1951 at a dispensary where he had been taken because of a temperature of 101.6° F. The physical examination, roentgenogram of the chest, leukocyte count, differential count, and malarial smear were all negative. He was given 300,000 units of penicillin and returned to the stockade. On the following day he was returned to the dispensary because of chills and fever. His clothing was noted to be soiled with

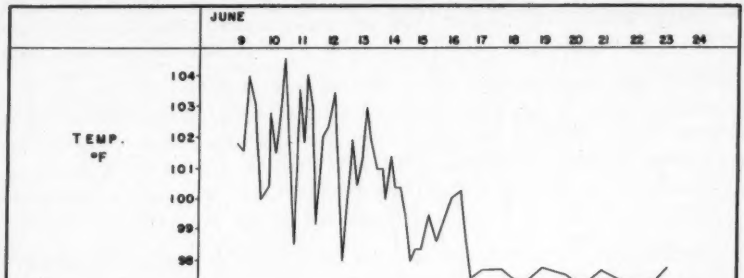

Figure 2 (case 2). Salmonella fever due to S. paratyphi.

urine. At the stockade he refused medication and tried to destroy his clothing, his identification papers, and 200 dollars' worth of bills. Physical examination at this time revealed an apathetic, negativistic man with a temperature of 102.2° F. and a pulse rate of 110. His pharynx was reddened and there was crusting of the eyelids at their margins. His skin showed no evidence of a rash. The remainder of the physical examination was negative. His leukocyte count was 8,800 with 66 percent neutrophils and 34 percent lymphocytes and the malarial smear was negative. The diagnosis at this time was fever of undetermined origin with a question of encephalitis and secondary psychosis.

He was admitted to the 3d Station Hospital on 9 June with a temperature of 101.8° F., pulse 102, and respirations 20. He was apathetic, lethargic, and unresponsive, but conscious. Small cervical lymph nodes were palpable. No nuchal rigidity was present. A lumbar puncture on admission produced clear fluid under normal pressure, containing only 3 cells per cc., sugar 66 mg. per 100 cc., chlorides 634 mg. per 100 cc., and proteins 21 mg. per 100 cc. The spinal fluid culture was negative. Blood cultures were taken on admission and reported

positive for *Salmonella paratyphi* on 14 June. On 10 June the patient continued to have a low-grade fever (high 102.8° F.) and treatment with 300,000 units of penicillin daily was started. Widal, Weil-Felix, brucella and tularemia agglutinations on 10 June were negative. A leukocyte count at this time revealed 13,650 cells with 73 percent neutrophils, 23 percent lymphocytes, and 4 percent monocytes. The sedimentation rate was 28. The hemoglobin was 16.8 grams per 100 cc. The patient's mental condition remained unchanged and his physical examination remained negative.

On 11 June his temperature exceeded 104° F. twice and treatment with 0.5 gram of aureomycin every 6 hours was started. After 5 doses of aureomycin, he showed no clinical response. Accordingly, at 1600 hours on 12 June aureomycin was discontinued and chloramphenicol therapy was started. An initial dose of 2 grams was given followed by 0.5 gram every 6 hours. On 13 June 0.5 gram of streptomycin every 6 hours, was given concurrently with the chloramphenicol. There was a gradual response. The fever fell by lysis, reaching 98° F. on the morning of 15 June (fig. 2). During his hospitalization the patient's peculiar mental state, which had progressed to the point of complete disorientation, was thought to be secondary to his febrile disease, but on 15 June, when his temperature returned to normal, he remained completely disorientated. His stools, examined on 12, 13, and 14 June, revealed hookworm and trichuris infestation. Except for a brief rise to 100.4° F. on the evening of 16 June his temperature remained normal. Streptomycin therapy was discontinued on 16 June and chloramphenicol on 24 June. The patient was evacuated to a hospital in Japan on 24 June because of his psychosis.

Comment. In this case aureomycin was not given an adequate trial. Chloramphenicol, however, brought the temperature to normal within 60 hours.

Case 3. A 45-year-old South Korean had complained of fever, fatigue, headache, and anorexia for about 1 month. For about 10 days at the onset of his illness he had had diarrhea. A blood culture, taken on 23 June 1951, produced *S. paratyphi.* When the results of this culture were known on 27 June he was started on terramycin. Just before his first dose another blood culture and a stool culture were obtained. This time *S. typhosa* was obtained from the blood while *S. paratyphi* was recovered from the stool. The initial dose of terramycin was 2 grams followed by 0.5 gram every 6 hours for 6 days, a total dose of 14 grams. There was a prompt clinical and bacteriologic response to therapy. The temperature which had varied between 100 and 103.6° F. fell by lysis (fig. 3). On 1, 2, and 3 July there was an evening rise to 100° F. but thereafter the patient remained afebrile, gained strength, and made a complete clinical recovery. Five stool cultures taken after treatment was begun were negative for enteric pathogens. Six weeks after completion of therapy the patient was well and ready to return to work.

Comment. This patient had been ill for a month when treatment was started. He had the very unusual condition of simultaneous typhoid and paratyphoid fever. *S. typhosa* and *S. paratyphi* had both been isolated from the blood within a period of 4 days and *S. paratyphi* had also been recovered from the stool. A prompt clinical response was obtained on treatment with terramycin. The temperature remained normal after the sixth day of terramycin therapy.

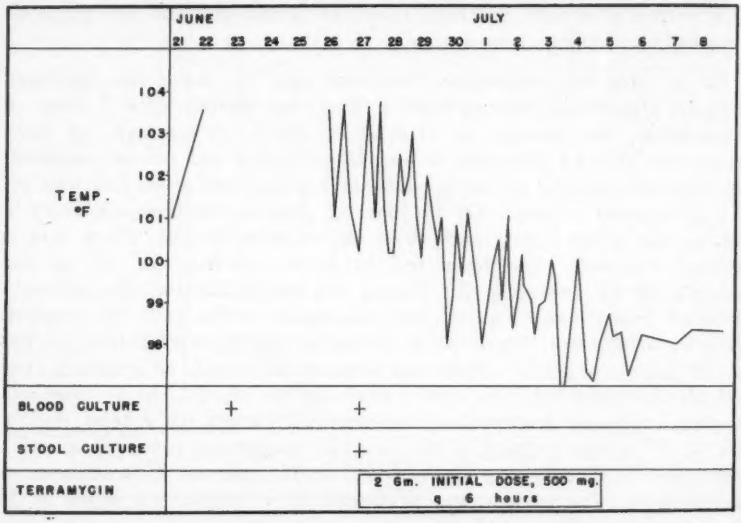

Figure 3 (case 3). Simultaneous typhoid and paratyphoid fever due to S. typhosa *and* S. paratyphi.

Case 4. A 21-year-old man noted headache, fever, and sweating on the evening of 10 April 1951. His temperature was 102° F. On the next day he complained of thirst, headache, generalized aching, anorexia, and constipation. Bed rest and salicylates produced no relief and the patient was admitted to the 3d Station Hospital on 12 April. A blood culture taken on admission was reported the following evening as positive for *Salmonella schottmülleri.* Examination on the afternoon of 13 April revealed a hot, dry skin but no rash. The liver and spleen were palpable 3 fingerbreadths below the costal margin. The temperature at this time was 103.4° F. with a relative bradycardia (94). The patient had not noted any bowel disturbance until the evening of 13 April when he had 1 watery stool. *Salmonella schottmülleri* was also recovered from this specimen. Two grams of chloramphenicol was administered at 2000 hours and subsequently 0.5 gram was given every 6 hours for 7 days. The patient became afebrile 72 hours after this treatment was started and remained afebrile thereafter (fig. 4). Blood, urine, and stool cultures remained negative after starting chloramphenicol therapy.

Comment. Because this patient was a technician in our own laboratory it was possible to follow him closely after his discharge from the hospital. At no time did he show any clinical or laboratory evidence of recurrence. He had received a booster immunization against *S. schottmülleri* just 6 weeks prior to this illness. As a result of early diagnosis, specific therapy was started soon after the onset of symptoms. There was a prompt response to treatment with chloramphenicol. The patient was discharged to full duty 8 days after antibiotic therapy was started and has remained well.

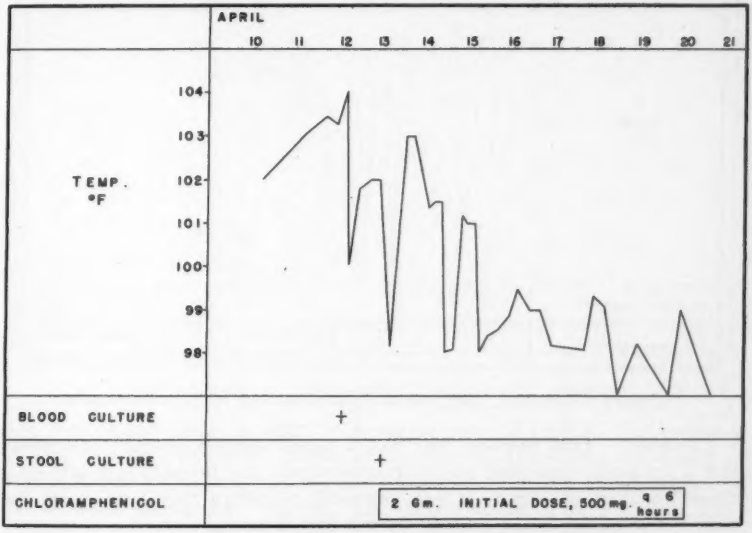

Figure 4 (case 4). Salmonella fever due to S. schottmülleri.

Case 5. A 29-year-old Thailand soldier was admitted to the 10th Station Hospital on 17 March 1951. About a week before admission he had suffered from exposure to cold over a period of 2 days. He then developed headache and fever. A few days later he became hoarse and developed a cough with chest pains. On admission a history was unobtainable because of language difficulties. Malarial smears were negative. The leukocyte count was 21,300 with 78 percent neutrophils. A blood culture, taken on 18 March when his temperature was 105.4° F., produced a gram-negative rod in pure culture. The blood plate was submitted to this laboratory for identification on 20 March. On the basis of biochemical reactions and serologic characteristics, the organism was identified as a *Salmonella choleraesuis,* variety Kunzendorf.

Meanwhile the patient had been transferred to the 3d Station Hospital where Thailand physicians were available. On the evening of 20 March

when it was learned that the patient had a Salmonella septicemia, chloramphenicol therapy was begun. He was given an initial dose of 2 grams followed by 0.5 gram every 6 hours until his discharge on 27 March. There was a dramatic response to therapy, the temperature remaining normal after the first 24 hours of treatment (fig. 5).

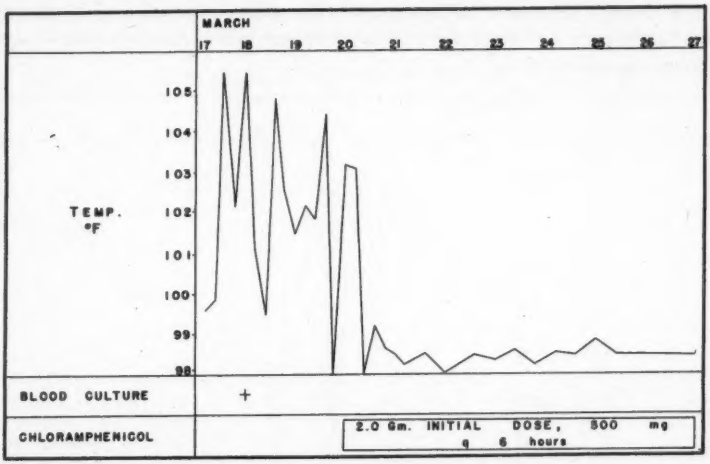

Figure 5 (case 5). Salmonella septicemia due to S. choleraesuis.

Comment. This patient, who had a septic febrile course, demonstrated a dramatic response to chloramphenicol, the temperature falling to normal within 24 hours. It was possible to return this soldier to duty only 1 week after being started on specific therapy.

Case 6. A 25-year-old man was admitted to the 3d Station Hospital on 23 August 1951 with headache and anorexia of 2 weeks' duration. On the day of admission his headache became so severe that he could hardly see and he complained of photophobia and sacroiliac pain. Physical examination was entirely negative except for a temperature of 104° F. Two malarial smears were negative. The leukocyte count was 3,500 with 60 percent neutrophils, 38 lymphocytes, and 1 percent each of monocytes and eosinophils.

On the morning after admission his temperature reached 105.4° F. A blood culture taken at this time produced a *S. paratyphi.* Spiking fever continued and a blood culture taken on 27 August was also positive for *S. paratyphi.* Chloramphenicol therapy was begun on 27 August with an initial dose of 2 grams followed by 0.5 gram every 6 hours. After 5 days' treatment there had been only a partial response. At this time the results of the culture were not yet known and the patient had nausea and vomiting. Because this was thought to be due to the chloramphenicol, the drug was discontinued. During the next 5 days a low-grade fever of

99-101° F. persisted (fig. 6). Blood cultures taken on 6 and 9 September were negative.

When the results of culture were available chloramphenicol therapy was reinstituted. An initial dose of 2 grams on 6 September was followed by 0.5 gram every 6 hours for 9 days. Within 3 days the tempera-

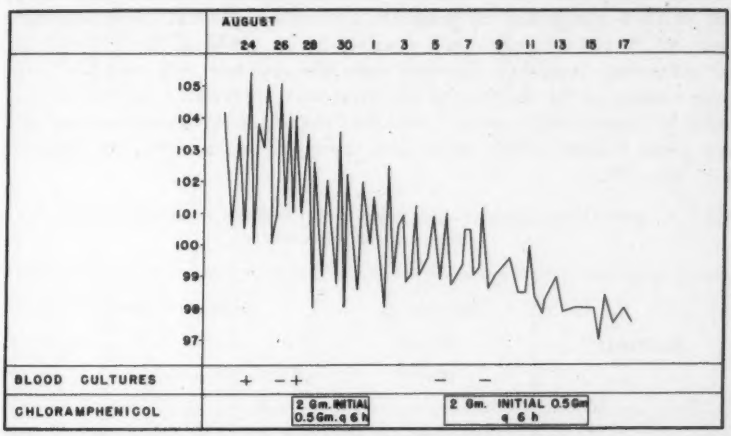

Figure 6 (case 6). Salmonella fever due to S. paratyphi.

ture was normal and, except for a single rise to 100° F., it remained normal. During his entire course the patient had a leukocyte count of from 2,450 to 4,350 and reached the 5,000 level only on 12 September, 3 weeks after admission. He was discharged to duty on 18 September.

Comment. This patient with paratyphoid fever showed a partial response to 5 days of chloramphenicol therapy. Continued improvement followed during the ensuing 5 days. Although blood cultures became negative the patient still had a low-grade fever. This responded promptly to renewed treatment with chloramphenicol.

Case 7. A 30-year-old soldier developed diarrhea with periumbilical cramps on 13 June. He denied consumption of any indigenous foods. On 15 June he complained of chills and fever which persisted for 2 days. Watery diarrhea continued as did the periumbilical cramping. There was marked anorexia but no nausea or vomiting. He was admitted on 16 June 1951 to the 8063 Mobile Army Surgical Hospital where, because the urine was dark in color, a tentative diagnosis of hepatitis was made. He was transferred to the 121st Evacuation Hospital where his liver was thought to be enlarged. Urinary urobilinogen was positive at a dilution of 1:40. The icterus index and thymol turbidity test were within normal limits. On 19 June the leukocyte count was 3,900 with 61 percent neutrophils, 24 percent lymphocytes, 10 percent monocytes, 2 percent eosinophils, and 3 percent basophils, but on 22 June a leukocyte count

of 7,500 with 49 percent neutrophils, 43 percent lymphocytes, 2 percent eosinophils, and 6 percent monocytes was obtained. Two stool examinations for ova and parasites were made, 1 of which showed cysts of *Endamoeba coli.*

Because of the continued diarrhea with associated cramping and anorexia the patient was transferred to the 3d Station Hospital on 22 June with a diagnosis of possible amebiasis. Rectal swab cultures taken on 25 and 26 June were positive for *S. typhosa.* By 25 June he had recovered from his diarrhea and his appetite had returned. His entire course at the 3d Station Hospital was afebrile. A review of this soldier's immunization record revealed that typhoid immunizations had been given 5 times within the past 6 years, the most recent having been on 15 May 1951.

TABLE 1. *Sensitivity levels of 22 strains of* S. paratyphi *to chloramphenicol, terramycin, and aureomycin*

Antibiotic	Number of strains tested	Sensitivity levels*				
		2.5	4.9	9.6	14.1	18.6
Chloramphenicol	22	0	11	10	0	1
Terramycin	22	0	11	9	2	-
Aureomycin	22	0	2	5	15	-

*Sensitivity levels are expressed as the lowest concentration of antibiotic (micrograms per ml. of MacConkey agar) that would completely inhibit growth on MacConkey plates.

In spite of the fact that he was asymptomatic it was thought advisable to eradicate his carrier state. On 1 July he was given an initial dose of 2 grams of terramycin after which he received 0.5 gram every 6 hours for 4 days. A rectal swab culture taken on 1 July just before therapy was begun was positive for *S. typhosa.* Cultures thereafter were consistently negative until the patient's discharge on 8 July.

Comment. This patient apparently had a mild self-limited infection with *S. typhosa* and then became a carrier. Three positive cultures were obtained before terramycin therapy was started. Thereafter all cultures remained negative. Although it would have been desirable, it was not possible to follow this patient for longer than 1 week after instituting antibiotic therapy.

DISCUSSION

The predominance of *S. paratyphi* strains in the Far East was again evident in this series of salmonella infections. Previous studies made in this laboratory had indicated the in vitro sensitivity of *S. paratyphi* strains to chloramphenicol and terramycin and their relative insen-

TABLE 2. *Summary of antibiotic treatment of 7 patients with salmonella infection*

Case	Type of infection	Organism	Total grams given			Number of days from starting antibiotic therapy to	
			Chloramphenicol	Terramycin	Aureomycin	Termination of fever	Return to duty
1	Salmonella fever	*S. paratyphi*	18	0	10	5	13
2	Salmonella fever	*S. paratyphi*	24	0	2.5	6	*
3	Salmonella fever	*S. typhosa and S. paratyphi*	0	14	0	6	**
4	Salmonella fever	*S. schottmülleri*	17	0	0	3	8
5	Salmonella septicemia	*S. choleraesuis*	16	0	0	1	7
6	Salmonella fever	*S. paratyphi*	32	0	0	15	22
7	Typhoid carrier	*S. typhosa*	0	10	0	Afebrile carrier	7

* This patient was evacuated because of a psychosis.
** This patient was nonmilitary.

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sitivity to aureomycin. This is shown in table 1. Half of the strains tested were in the highly sensitive zone and slightly less than half were moderately sensitive to chloramphenicol and terramycin. On the other hand, almost three-quarters of the strains were insensitive to aureomycin. One strain proved to be an exception to this generalization, being resistant to chloramphenicol but only insensitive to aureomycin. This was the only strain found to be resistant to 15 micrograms of any of the antibiotics used.

The clinical results obtained in this small series of cases (table 2) correlate well with the in vitro findings. It is true that aureomycin was not given an adequate trial but certainly the clinical and bacteriologic results obtained with chloramphenicol and terramycin were very encouraging. Equally good results were obtained when the infecting organism was *S. typhosa, S. schottmülleri,* and *S. choleraesuis.* Fever lasted an average of only 6 days after the start of therapy in the 6 clinical infections treated. Patients treated early tended to respond more rapidly than those who were not treated until several weeks after the onset. Except for 1 psychotic patient all were able to return to normal activity after a relatively short period of hospitalization. The 1 typhoid carrier also responded promptly. On 3 occasions prior to therapy, stool cultures were positive for *S. typhosa.* All cultures taken after terramycin therapy was started were negative. Unfortunately the follow-up in this case was short so that we do not know whether a permanent eradication of the carrier state was obtained.

SUMMARY

Seven patients with salmonella infections were treated with one or more of the newer antibiotics. In each instance gratifying clinical and bacteriologic results were obtained. In vitro and clinical results obtained with chloramphenicol and terramycin suggest that these antibiotics are superior to aureomycin in the treatment of salmonella infections.

BOOKS RECEIVED

The Practice of Endocrinology, edited by *Raymond Greene,* M. A., D. M., M. R. C. P. 389 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $12.50.

Management of the Newborn, by *Arthur Hawley Parmelee,* M. D., Professor of Pediatrics, University of Southern California School of Medicine; Senior Attending Pediatrician, Los Angeles Childrens Hospital; Formerly Clinical Professor of Pediatrics (Rush), College of Medicine, University of Illinois, and Attending Pediatrician, Presbyterian and Cook County Hospitals, Chicago. 358 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $7.

The Clinical Effects of Dextran as a Plasma Volume Extender[1]

Julius H. Spence, *Lieutenant, MC, U. S. N.*
Alton R. Higgins, *Captain, MC, U. S. N.*
Joe R. Kimmel, *Lieutenant, MC, U. S. N. R.*

THE development of dextran, a macromolecular polysaccharide, as an agent which might be effective as a plasma volume extender in oligemic shock, has been followed by much investigative work in Sweden (2-4), England (5, 6), and recently in the United States (7-9). The substance has been shown to maintain colloid osmotic pressure in the vascular space (4, 10, 11), to be stable at usual temperature ranges for reasonably long periods (4, 5), and to be sterilized easily (2, 5, 11). It may be reproduced by practicable manufacturing methods (12) and may be produced without pyrogens (11, 13).

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TABLE 1. *Clinical observations on the effects of dextran*

Patient	Sex	Age (years)	Diagnosis	Operation performed	Blood pressure		Reaction	Comment
					Before infusion	After infusion		
1	F	44	Cholelithiasis	Cholecystectomy	40/0	160/110	None	Patient in shock 2 hr. postoperatively; given 500 cc. of dextran solution with return of blood pressure to normal in 25 min.
2	M	20	Wound, missile, arm, with nerve involvement	Aneurysmorrhaphy of radial artery	108/70	120/80	None	Patient received whole blood during operation and was given 200 cc. of dextran solution while awaiting more blood; blood pressure maintained.
3	M	40	Ruptured intervertebral disk	Laminectomy	100/80	138/82	None	Patient had received 1000 cc. of 5% dextrose solution and 500 cc. of whole blood. As the blood pressure continued to fall, 500 cc. of dextran solution was given over a 30-min. period with good results.
4	M	63	Wound evisceration	Secondary closure	110/92	130/90	None	Patient had initial blood pressure of 150/90. As the blood pressure and pulse pressure diminished, 500 cc. of dextran solution was given over a 45-min. period.
5	M	19	Wound, missile, with nerve involvement	Exploration of brachial plexus	100/60	140/80	None	Patient received 750 cc. of 5% dextrose solution followed by 200 cc. of dextran solution. During administration of the dextran 25 mg. of ephedrine was given intravenously.

TABLE 1. *Clinical observations on the effects of dextran*—Continued

Patient	Sex	Age (years)	Diagnosis	Operation performed	Blood pressure		Reaction	Comment
					Before infusion	After infusion		
6	F	21	Thrombocytopenic purpura	Splenectomy	98/60	120/78	None	Patient had initial blood pressure of 125/80. While awaiting whole blood, 500 cc. of dextran solution was given with return of the blood pressure to normal in 30 min.
7	M	19	Burns, multiple	Skin graft	86/50	100/60	None	Patient received 500 cc. of dextran solution over a 30-min. period with return of the blood pressure to normal.
8	F	31	Ruptured ovarian cyst	Exploratory laparotomy	110/70	110/70	Urticarial lesion of forehead	Patient was given 300 cc. of dextran solution prophylactically during operation. No alteration of blood pressure was noted.
9	F	65	Carcinoma of breast	Radical mastectomy	0/0(?)	122/80	None	At one point during operation the blood pressure was not obtainable and the pulse was feeble. Patient received 175 cc. of dextran solution in 15 min. and recovered.
10	M	29	Frostbite	Amputation below the knee	100/90	120/88	None	Patient received 400 cc. of dextran solution with satisfactory rise in blood pressure. Operation was performed under tourniquet.

The definitive metabolic fate of dextran is not known, although evidence is available from recovery studies by chemical and C^{14} label methods which indicate some metabolic degradation of the moiety retained in the body *(14)*. No adverse effects of the storage of this retained fraction, amounting to about 60 percent of the infused dextran, have been proved *(9)*. A further point involving uncertainty of clinical safety has been raised by a high incidence of untoward reactions obtained with some preparations of dextran *(13)*. This high rate of reactions has not occurred with other lots of the material *(8, 13)* and has been virtually absent in the anesthetized patient *(7, 13)*.

The purpose of this report is to record observations on the administration of dextran to 10 patients undergoing surgical procedures.

MATERIALS

Dextran was administered intravenously in a strength of 6 percent in normal saline solution to 10 patients in this hospital. The indication for the use of dextran was usually a drop in blood pressure from basal levels. The rate of infusion was about 10 cc. per minute. In several patients the giving of dextran was preceded or followed by a transfusion of whole blood. The blood pressure was recorded frequently throughout the transfusion and clinical observations were made. Details are presented in table 1. In general, hypotensive surgical shock and shock-like states were effectively treated by dextran infusion, with prompt return of the blood pressure to satisfactory levels. In 1 patient (case 8) dextran given prophylactically produced no change in blood pressure. In this patient an urticarial lesion appeared on the forehead during the infusion and disappeared within a few hours. No other untoward reactions were noted. No thrombophlebitis occurred at the site of infusion.

CONCLUSION

Dextran appeared to act as a satisfactory plasma volume extender in the 10 patients observed.

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The Plasma Expanders[1]

Edwin J. Pulaski, *Lieutenant Colonel, MC, U. S. A.* (2)

WHOLE blood is the only completely effective replacement following severe shock whether caused by hemorrhage, burns, or tissue damage. Even though the circulating volume is maintained after traumatic injury, failure to supply the vital body organs with sufficient oxygen may lead to an irreversible state of shock after which the further administration of fluids, or even blood itself, will not save the patient. If, then, whole blood is the best fluid replacement in shock, why is it pertinent to consider plasma expanders? Chiefly for 2 reasons:

1. The problem facing us in a disaster is the immediate availability of adequate amounts of blood. Even through the use of procurement teams, this problem still can be only partially solved because of the large quantities needed. Whole blood can at present be preserved only for relatively short periods, thus it is impossible to build stockpiles sufficient for an emergency. Problems of refrigeration may limit availability in certain disaster areas. In the event of disaster, then, plasma and plasma expanders will have to make up the enormous difference between supply and demand.

2. In mild shock, where loss of blood has not been excessive, it is more economical to replace only the substances lost, and plasma or plasma expanders may be adequate for restoration of the circulating blood volume.

The fluids used when whole blood is not available may be classified as blood derivatives and plasma expanders. The blood derivatives are plasma and serum albumin. Globin is now under intensive study. Plasma (1) aids in maintaining and stabilizing the blood volume, (2) transports red blood cells, antibodies, nutrients, and hormones to the tissues, and (3) provides components of the clotting mechanism. The most serious complication resulting from the use of plasma has been homologous serum jaundice. One problem urgently requiring solution

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(1) Presented at the annual meeting of the American Pharmaceutical Manufacturers Association, New York, N. Y., November 27, 1951.

(2) Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C.

is the development of a preservative for pooled plasma which will prevent the transmission of disease. Although albumin, produced by the fractionation of plasma, has certain advantages and disadvantages over plasma, the problems of sterility and supply are the same as for plasma and, in addition, the product is expensive. Bovine albumin was tested during World War II and, because it could not be made nonallergenic, its use was discontinued. This problem also applies to modified animal plasma currently being investigated by Japanese scientists.

The use of a modified human globin preparation as a plasma substitute was first described in 1945, by Strumia et al., who reported that human globin solutions showed promise as safe and effective preparations in replacing lost blood in patients with severe shock. Globin is prepared from unwashed red blood cells salvaged in the processing of plasma and plasma derivatives. The resulting product is stable for a period of years, either in the dried form or in solution. Between 2 and 3 units of globin, each osmotically equivalent to 250 cc. of plasma may be obtained from the cell residue of a single bleeding. Globin solutions show great promise as plasma extenders. They can be administered safely to patients. Only a fraction of the amount infused is excreted in the urine. The remainder becomes part of the protein pool of the body. The material has not yet reached the state of refinement where a standardized product is obtained. The presently available product still gives a certain percentage of allergic and febrile reactions.

Because of the difficulties in building up stockpiles of whole blood and blood derivatives for a national emergency, there is widespread interest in a group of storable substances which cause and maintain an increase in the circulating blood volume, namely, the plasma expanders. Many such substances have been described and studied, particularly those of large molecular size. Six percent solutions of gum acacia were used in World War I and thereafter until it was discovered that gum was stored in the body indefinitely and produced tissue damage in such organs as the liver. Pectin, also a polysaccharide derived from citrus fruits, has been tested and its use discontinued because the product could not be standardized so that it would be free of particles after storage for a long time. In the past few years new plasma expanders have been investigated, among them gelatin and its derivatives, dextran, and PVP (polyvinyl pyrrolidone). Each has its merits and its deficiencies. The following characteristics should be found in the ideal plasma substitute: (1) osmotically, it must be the equal of plasma; (2) its viscosity and retention in the blood stream must be about that of plasma; (3) it must be stable on storage; (4) it must be nonantigenic; (5) it must be nontoxic; and (6) it should be used in the body without unfavorable effects on cell structure and function. The gelatin products, dextran and PVP, only partially meet these requirements.

GELATIN AND GELATIN PRODUCTS

Gelatin has been subjected to comprehensive study in the past 10 years, and 6 percent solutions have been found to be both safe and effective as a plasma expander when given intravenously for the treatment of early stages of traumatic shock. This solution of gelatin is composed of relatively long molecular chains which may be retained in the circulation for as long as 4 days, and shorter molecular chains excreted by the kidney shortly after infusion so that their osmotic effects are only transitory. No significant damage to vital organs has been noted either in animals or humans receiving gelatin. There is evidence that some of the retained gelatin is metabolized. Solutions of the material are stable. The practical advantages of gelatin are its availability, low cost, and freedom from reactions. The disadvantages are: (1) the smaller molecules are not retained sufficiently long in the body; (2) difficulty with blood typing and cross-matching is encountered after infusions because of pseudoagglutination of the red blood cells, for which reason it is advisable that samples for blood matching be taken before a gelatin infusion is given; and (3) use in outdoor conditions is greatly limited by the fact that gelatin is in the physical state of a gel and at low temperatures plugs or runs slowly through intravenous equipment. Gelatin solutions that remain liquid at low temperatures have been produced and are on the market, but they consist of small molecules that are rapidly excreted and thus do not exert the same efficiency in the treatment of shock as do the larger molecules. Gelatin has the further disadvantage of being an incomplete protein and so does not contribute materially to the formation of new protein.

The gelling problem appears to have been largely overcome by the development of oxypolygelatin, and without sacrifice of molecular size and osmotic properties. Oxypolygelatin is prepared from the parent substance by decalcification with an ion exchange resin, condensation with glyoxal, oxidation with hydrogen peroxide, and sterilization by autoclaving. A 6 percent solution, which has a mean molecular weight of 40,000, remains liquid at temperatures down to 10° C. The product is nonantigenic. After infusion it has about twice the osmotic activity of an equivalent volume of plasma. The problem attending oxypolygelatin is the control of molecular size. Clinical trials have not been extensive, but results in treatment of early traumatic shock parallel those of gelatin.

POLYVINYL PYRROLIDONE

PVP is a colloidal polymer of acetylene of large molecular weight. It was developed in Germany as a plasma expander. A 3.5 percent solution in Ringer's solution has a mean molecular weight of about 40,000. PVP can be rapidly produced in large quantities from readily available materials. It is estimated that more than 500,000 intravenous

injections were given to German soldiers in World War II with satisfactory results. PVP is stable on storage in the dry form and in solution and is nonantigenic. It is about equal in effectiveness to plasma and gelatin in restoring diminished blood volume resulting from hemorrhage in the experimental animal and in man. The ultimate fate of PVP in the body is now undergoing investigation. From 20 to 50 percent of the amount infused can be accounted for in the urine in the unchanged state, and traces can be detected 10 days after injection. Experiments with radioactive materials have shown that less than 1 percent is exhaled as carbon dioxide in the first 10 days following administration. These experiments further demonstrate that the nonexcreted portion—the molecules having a molecular weight greater than 31,000—is taken up by the reticuloendothelial system, the skin, and the skeletal muscles, and stored for an undetermined length of time. Whether this storage will produce harmful effects is not yet determined. On the other hand, if the molecular size of PVP is reduced below 31,000, it is rapidly excreted by the kidneys and its function as a plasma expander then is short-lived. Acceptance of the material for unrestricted clinical use depends on clarification of the fate of material unexcreted after injection.

DEXTRAN

Dextran is a polysaccharide of high molecular weight composed solely of glucose molecules linked together through a 1-6D glucosidic bond. It is prepared by the fermentation of cane sugar. The crude product is hydrolyzed to give a material with a mean molecular weight of about 72,000. It is used as a 6 percent solution in 0.9 percent sodium chloride solution. From his experiments in 1944, Thorsen concluded that dextran could be used in man for the prevention and treatment of shock. He and others reported that it was an effective plasma expander, that it was noninjurious to tissues and could be stored safely for long periods. It does not interfere with blood typing or crossmatching. Various studies of the excretion of dextran have shown that between 1/4 and 1/3 of the infused amount is excreted in the urine within 24 hours, and some of the remainder over the next 4 or 5 days. Only insignificant amounts are excreted into the gastrointestinal tract. The fate of the retained larger molecules is still under investigation. Studies by Gray and myself suggest that there may be some utilization within the body by conversion to glucose, while the experiments of others with radioactive materials suggest that retained dextran is oxidized and exhaled as carbon dioxide. Retained dextran has not been found to have any deleterious effects on the tissues of the body. Wound healing is apparently not affected by the presence of large quantities of this substance in the plasma. Clinical trials in this country and abroad suggest that dextran infusions are effective for the resuscitation of patients with acute blood volume deficiency. This agent provides sufficient circulatory support to the patient, provided that hemorrhage has not been too great. It converts

the necessity for emergency transfusions to a more elective transfusion. In mild shock it may minimize the quantity of whole blood needed.

Dextran has been used extensively abroad and in this country apparently without any appreciable toxic reactions, but in a series of 120 infusions with dextran of foreign manufacture, in as many unanesthetized volunteers in military hospitals allergic reactions were encountered in about 40 percent of the patients. In patients under anesthesia or in shock, the incidence of reactions was 8 percent and these were less severe than in the normal volunteers. American-made dextran in our hands gave only 1 reaction in over 100 infusions given to as many volunteers. Work in progress at Walter Reed Army Medical Center suggests that dextrans contain sufficient nitrogenous products to cause the appearance of precipitins in a certain percent of patients. The presence of these antibodies appears to be correlated with the allergic reactions attending its administration. Further support for this rests in demonstrating positive skin tests and precipitins in man when small amounts of dextran are injected subcutaneously. Hence, until dextrans are further purified they cannot be regarded as completely inert. In addition, there is some evidence in patients with damaged kidneys that further damage occurs following infusion of moderate amounts of dextran, recovery from which may be delayed. The problems facing us with dextran are: (1) the availability of nitrogen free (nonantigenic) material, (2) more complete control of molecular size, and (3) definition of the dose which can be given with safety to man over a given period.

SUMMARY

There is no substitute for whole blood in the treatment of mass casualties during a national emergency. The American public must recognize its responsibility and keep at a maximum the flow of blood to blood banks and blood plasma processing centers. Inability at present to preserve whole blood beyond 3 weeks makes it impossible to build stockpiles of this material. Plasma and plasma substitutes must make up the difference between supply and demand. Stored pooled plasma has not yet reached the point of absolute safety from transmission of disease. A standardized human globin solution is not yet available. The material currently available is still capable of producing untoward reactions.

There is an urgent need for an effective plasma expander. In circumstances where hemorrhage has not been too severe, or until whole blood is available, the prompt and judicious use of these substances may be lifesaving. The advantages of the artificial colloid solutions are cheapness of production, stability when stored, and assured sterilization. Gelatin, polyvinyl pyrrolidone, and dextran only partially meet the requirements of a satisfactory product. Gelatin solutions have the disadvantages of solidifying at low temperatures, thus interfering with blood typing after infusion. Polyvinyl pyrrolidone, of large

molecular size, is retained indefinitely in the body while smaller molecules are rapidly excreted so that their functions as plasma expanders are limited. Dextran, like gelatin and polyvinyl pyrrolidone, is still to be controlled from the standpoint of molecular size. Certain preparations are apparently antigenic and may cause allergic reactions. Other disadvantages are the possibility of harmful effects on certain tissues or organs and the fact that end products are not likely to contribute to the synthesis of new body proteins.

BOOK REVIEW

Law of Hospital, Physician, and Patient, by *Emanuel Hayt,* LL. B., Lecturer in Hospital Administration, Columbia University and University of Minnesota; Counsel, Hospital Association of New York State and The Greater New York Hospital Association; *Lillian R. Hayt,* M. A., J. D. of the New York Bar; and *August H. Groeschel,* A. B., M. D., M. S., Assistant Director, The New York Hospital; Colonel, MC, U. S. A. R. Prepared in collaboration with *The American College of Hospital Administrators.* 2d edition, revised and enlarged. 804 pages. Hospital Textbook Co., New York, N. Y., publisher, 1952. Price $10.

This second edition is a fine treatise on the law as it pertains to all facets of patient care. The authors of the previous edition, Emanuel and Lillian R. Hayt, were recognized as outstanding authorities on medical jurisprudence and their text was used extensively in hospital administration. In this comprehensive revision they have collaborated with Doctor Groeschel, a seasoned hospital administrator, and have covered the progress in hospital administration, advances in medicine, and the changing attitudes of courts in respect to hospitals. Significant legal developments in the hospital and medical fields necessitated the inclusion of 23 new chapters in addition to revision of the original 31 chapters. These new developments include the responsibilities of the specialists, physical medicine service in the hospital, hospital dental service, contractual relationships, and other matters of importance. Since the enactment of the Federal Tort Claims Act, medical officers in the Armed Forces have become keenly aware of their liabilities with regard to patient care. Not a day goes by in the management of federal hospitals without some medicolegal problem requiring settlement. An entire chapter entitled, "Immunities and Liabilities of Governmental Hospitals," is devoted to the liability for the torts of officers and employees by the government. All hospital administrators, members of their professional staff, and departmental heads will find this book an invaluable source of readily available information on pertinent legal matters applicable to the daily management of patient care.

—*Col. M. L. Sheppeck, MC, U. S. A.*

Use of Tetracaine Intravenously as an Analgesic and Vasodilator[1]

Ray T. Smith, *Lieutenant, MC, U. S. N.* [2]

Scott Whitehouse, *Commander, MC, U. S. N.* [2]

SINCE 1942 numerous articles have appeared on the therapeutic value of procaine administered intravenously. It has been used as a vasodilator, an antihistaminic agent, an analgesic, and a cardiac depressant. The clinical results have been rated from poor to excellent. The method of giving an infusion of from 500 to 1,000 cc. of solution by slow intravenous drip is not practical in many cases because of the time and equipment involved.

Since September 1950 we have administered tetracaine intravenously to 92 patients. This article is a clinical analysis of the use of tetracaine intravenously in relatively large single injections. It is presented solely as a clinical investigation. We will not dwell on the theories of action because we believe they are closely related to those relating to procaine. This method of using tetracaine, rather than procaine, was suggested by Horan [3] who described the injection of 10 cc. of 0.25 percent tetracaine in from 3 to 5 minutes in patients with arthritis, leprosy, muscular strain, lower back pain, asthma, and other conditions. Early in its clinical use it was discovered that tetracaine acts chiefly as an analgesic and a vasodilating agent on patients receiving it intravenously.

We first tried an injection of 20 mg. diluted to 10 cc. with saline solution. This is an adequate dose for mildly painful states, but we soon began to use 40 mg. diluted to 10 cc. (a 0.4 percent solution) and discovered that this amount gives greater relief and has a longer action

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[1] Presented at the meeting of the Philadelphia County Society of Anesthesiologists on 2 November 1951.

[2] U. S. Naval Hospital, Philadelphia, Pa.

[3] Horan, J. S.: Intravenous administration of tetracaine (pontocaine) hydrochloride; preliminary report. Arch. Int. Med. 85: 972-979, June 1950.

time than the smaller dose. This dose has been standard except in very painful conditions and in elderly patients. In a few patients weighing over 200 lb. and in those with severely painful conditions, 60 mg. was found to be the optimal dose.

METHOD

The total dose to be injected was estimated and mixed with saline solution, 5 percent dextrose solution, or distilled water to a total amount of 10 cc. The optimal injection time is about 2 minutes except in initial injections when the following procedure was carried out. One-tenth cubic centimeter of the solution was injected intravenously and the patient observed for 1 minute. If no untoward effect was noted, 1 cc. was injected and the patient again observed for 1 minute. If no untoward effect was noted, the rest of the dose was injected in about 2 minutes. Subsequent injections were given in 2 minutes or less without hesitation.

TOXICITY

No signs or symptoms of toxicity were noted in any patient who was given the 40 mg. dose in more than 2 minutes. Eighteen patients received 40 mg. in 20 seconds with only mild subjective symptoms of toxicity. Sixteen injections of 60 mg. and 6 injections of 80 mg. were given without producing symptoms. Mild generalized convulsions were noted in a 58-year-old man, weighing 123 lb., who received 120 mg. in less than 5 minutes. This convulsion was easily controlled with 75 mg. of thiopental sodium intravenously. One 20-year-old patient who received 20 mg. in 45 seconds had a vertical nystagmus with a mild movement of the arms, lasting less than 30 seconds. No treatment was necessary.

We noticed mild untoward effects in a few patients who received rapid injections. Most notable were dizziness and a condition simulating otocleisis. The latter was generally described as a "blocking of the ears like the sensation noticed when going through a tunnel." Several patients noticed mild syncope without loss of consciousness and mild generalized sweating. The vision of 1 patient was clouded for an hour following each of 4 injections. Another, who had had a cerebrovascular accident 2 years previously, with resultant poor vision, noted a dramatic increase in visual acuity. This suggests the use of tetracaine intravenously in acute cerebrovascular accidents in addition to or instead of stellate ganglion blocks. Two patients noticed a peculiar taste they could not describe. One diabetic described a reaction similar to mild insulin shock. Several patients receiving multiple doses noted an increased appetite.

Serial LCG's were made on 6 patients immediately prior to and immediately following an injection of 10 cc. of 0.4 percent tetracaine. Four of these had normal tracings and 2 had abnormal tracings *before* the injection of tetracaine. None of the 6 tracings showed significant

changes after the patients had received injections of tetracaine intravenously. Blood pressure readings were taken on some of the patients and showed little change before or after injection except in those who had received rapid injections. The greatest change occurred in a 69-year-old, arteriosclerotic, hypertensive patient with diabetes who had a drop from 170 to 160 in his systolic and no change in his diastolic pressure. One patient received 92 injections in the same vein without harmful effect.

We saw no patient of the type described in articles and textbooks who died after the injection of a few cc. of local anesthetic, intravenous or otherwise. We did, however, administer tetracaine intravenously with caution. We kept immediately at hand thiopental sodium, phenylephrine hydrochloride, and a gas machine for treating a patient in such an emergency.

RESULTS

Tetracaine was given intravenously to 2 groups of patients. The *first* group consisted of patients with a condition in which an analgesic vasodilating agent was desirable. Most of those with acute peripheral vascular diseases were in this group. It was used on patients with obliterative and diabetic types of arteriosclerosis with and without gangrene. One patient with gangrene of primary, nondiabetic, arteriosclerotic origin was helped markedly, with a regression of the gangrene of from 1 to 3 cm. In a patient with early diabetic gangrene of the left fourth toe of 4 days' duration, the gangrene cleared up after 8 injections given daily and the toe appeared normal in 2 weeks. Patients with acute thrombophlebitis were immediately relieved of pain following the first injection and each noted a vasodilating effect which lasted from 2 to 47 hours (average 20). One injection daily for 3 or 4 days usually relieved the pain and apparently cured the acute conditions. From 5 to 10 injections were necessary for cases of from 6 to 8 weeks' duration which had not responded to other treatment, notably whisky, oranixon, or benzazoline. It was our clinical impression that in most patients tetracaine administered intravenously gave at least as good a result and, in some, better results than lumbar paravertebral sympathetic blocks. Chronic varicose ulcers in 2 patients healed after 2 weeks of daily injections. Seven patients with such conditions as arterial embolism, thrombosis, and trauma showed marked relief from pain and warming of the extremity distal to their lesion. One patient received more benefit from the intra-arterial injection of 40 mg. of tetracaine than from a previous intravenous injection.

Eight of the 12 patients with third degree frostbite who had pain, numbness, paresthesia, and cold extremities responded dramatically with a marked decrease in each of the mentioned symptoms. Five of these requested further injections following the initial injection because they felt so much better. Two were receiving oranixon and 3 were receiving benzazoline. Each of these noted a decrease in painful

symptoms and a feeling of warmth following the injection of tetracaine, which exceeded the effect from oranixon or benzazoline. Several patients who had received multiple doses of whisky stated that the tetracaine had as much effect on the temperature of their legs as the whisky. Four patients with slowly healing amputation stumps noted a marked increase in healing while receiving tetracaine intravenously. One patient with incidental severe causalgia following a compound fracture with macerated tissue showed a very favorable response.

One patient with Raynaud's disease who had painful, cold, gray-blue fingers was given 40 mg. of tetracaine intravenously and within 15 minutes his fingers were beefy red and no longer painful. Two patients with thromboangiitis obliterans were able to take twice as many steps upstairs following the tetracaine. Permanent results were equivocal in 1 patient who had had a bilateral sympathectomy, although he was able to walk farther without cramps and tiring following a series of 4 injections.

The *second* group of patients included those in whom the primary desired effect was relief from pain. Dramatic effects were noted in 6 patients with acute rheumatoid arthritis. They received great relief and were able to walk much sooner than it is likely they would have without the injections. Ten patients who had been in plaster casts for long periods and had developed stiff painful joints noted an increase in mobility and less pain, thus reducing their period of morbidity and allowing them to return to work sooner than would otherwise have been possible. The *third* group included patients whose burn dressings required changing (they needed the largest doses), patients with localized pain due to carcinoma, and others with a variety of painful conditions. Temporary results lasting up to 24 hours were noted in several patients with pruritic neurodermatitis. Table 1 summarizes the conditions treated, the total doses used, and the results.

DISCUSSION

Tetracaine, potent, yet apparently safe when administered intravenously, was found clinically useful in many peripheral vascular diseases and in some painful states, notably rheumatoid arthritis and arthritis resulting from holding orthopedic patients in plaster casts for long periods of time. We have admittedly used doses which heretofore have been considered extremely high but have encountered few toxic manifestations. We believe the toxicity resulting from this drug when used topically can occur only from extremely high doses, many of which have not been measured. The analgesic effect of tetracaine given intravenously has been great, exceeding that of morphine in a few patients. Its vasodilator effect has exceeded that of benzazoline and oranixon in some patients. Clinically, it is similar to ethyl alcohol given orally in the potency of its vasodilating effect, but its effect appears to be limited to the diseased area. Clinically, it also appears to equal or exceed the action of sympathetic nerve blocks in selected patients. On the

TABLE 1. *Summary of results of treatment with tetracaine*

Conditions treated	Number of doses	Clinical results (patients)				Total
		Excellent	Good	Fair	Failure	
Peripheral vascular diseases						
Arteriosclerosis, nondiabetic	28	2	1	1	-	4
Arteriosclerosis, diabetic	33	2	1	-	1	4
Thromboangiitis obliterans	11	-	3	-	-	3
Raynaud's disease	5	1	-	-	-	1
Thrombophlebitis	34	4	5	3	-	12
Varicose ulcers	2	2	-	-	-	2
Cellulitis secondary to stasis ulcers	1	1	-	-	-	1
Arterial embolism or thrombosis	22	-	4	1	1	6
Arterial trauma	4	1	1	-	-	2
Frostbite, third degree, and trenchfoot	30	6	3	-	3	12
Slow healing of wounds	140	-	4	-	-	4
Subtotal	310	19	22	5	5	51
Arthritides						
Rheumatoid arthritis	60	6	2	1	-	9
Rheumatoid spondylitis	5	-	1	-	1	2
Arthritis of knee, unclassified	1	1	-	-	-	1
Painful, stiff joints following prolonged immobilization	61	6	4	-	-	10
Subtotal	127	13	7	1	1	22
Miscellaneous conditions						
Change of burn dressing	2	-	2	-	-	2
Localized pain	9	2	3	-	1	6
Neurodermatitis and pruritus	65	2	2	2	2	8
Hiccough	3	-	-	-	2	2
Polyneuritis	1	-	-	-	1	1
Subtotal	80	4	7	2	6	19
Total	517	36	36	8	12	92
Percent		39.1	39.1	8.7	13.0	

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basis of our clinical impression, this method is practical to use because most patients can be given a single daily intravenous injection of 10 cc. of a 0.4 percent solution of tetracaine with a minimal expenditure of time.

SUMMARY

Ninety-two unselected cases, including 51 patients with peripheral vascular disease and 41 patients with painful states including several arthritides were treated with intravenous injections of tetracaine in relatively large doses and clinically evaluated. Pain relief and/or a marked vasodilator action was noted in 78 percent of the patients.

BOOK REVIEW

Endocrine Functions of the Pancreas, by *Bernard Zimmermann,* M. D., Department of Surgery, University of Minnesota, Minneapolis, Minn. American Lecture Series Publication No. 114, A Monograph in American Lectures in Endocrinology. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.50.

With the introduction of ACTH and cortisone in clinical medicine, endocrinologists have, in the past few years, largely directed their attention to the pituitary and adrenal glands and have somewhat neglected the pancreas. The publication of this excellent monograph on the endocrine functions of the pancreas is, therefore, most timely. The author, who has long been interested in the pancreas, has carefully reviewed the current literature on this gland, gleaned that which is sound and currently acceptable, and compiled his findings in a concise and readable monograph. He has been scrupulously impartial in presenting divergent opinions on controversial aspects of pancreatic function. The important research of such authorities as Corri, Soskin, Best, Mirsky, Levine, and others has been carefully presented, emphasizing the strong and weak points of the various conclusions.

The book is attractively arranged and very readable. Its 7 chapters cover history; the nature of insulin; metabolism in diabetes and the action of insulin; the regulation of internal pancreatic secretion; special problems in lipid metabolism; the hyperglycemic factor; and conclusions. This book should be of special interest to those who are specializing in endocrinology and to those who are engaged in general internal medicine.—*Col. E. L. Keboe, MC, U. S. A.*

Observations on Essentially Normal Young Men Treated With ACTH and Cortisone[1, 2]

III. Side Effects During Therapy

Saul B. Appel, *Major, MC, U. S. A.*
Lyman A. Fulton, *Lieutenant, junior grade, MC, U. S. N. R.*
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ACTH and cortisone are pharmacologic substances producing profound physiologic effects in man (3-5). As Hench so aptly observed, these drugs are "dynamite." The disturbed physiology in seriously ill, debilitated patients renders them more likely than normal or slightly ill subjects to manifest a serious complication during therapy. As described previously (6, 7) the subjects in this study were young combat veterans with frostbite injuries limited to the terminal extremities and which healed under medical care in all but one instance (ACTH 56).

METHOD

The subjects have been described previously (6, 7). The 13 subjects in the ACTH group were hospitalized for an average of 10.6 days, the

(1) From the Cold Injury Section, Osaka Army Hospital.

(2) The last of three articles on this subject. The statistical analyses were made by H. M. C. Luykx, D. Sc.

(3) Hench, P. S.; Kendall, E. C.; Slocumb, C. H.; and Polley, H. F.: Effects of cortisone acetate and pituitary ACTH on rheumatoid arthritis, rheumatic fever and certain other conditions. Arch. Int. Med. 85: 545-666, Apr. 1950.

(4) Sprague, R. G.; Power, M. H.; Mason, H. L.; Albert, A.; Mathieson, D. R.; Hench, P. S.; Kendall, E. C.; Slocumb, C. H.; and Polley, H. F.: Observations on the physiologic effects of cortisone and ACTH in man. Arch. Int. Med. 85: 199-258, Feb. 1950.

(5) Thorn, G. W.; Forsham, P. H.; Frawley, T. F.; Hill, S. R., Jr.; Roche, M.; Staehelin, D.; and Wilson, D. L.: Clinical usefulness of ACTH and cortisone. New England J. Med. 242: 783-793, May 18, 1950.

(6) Appel, S. B., and Orr, K. D.: Observations on essentially normal young men treated with ACTH and cortisone. I. Effects on glucose metabolism. Armed Forces M. J. 3: 207-219, Feb. 1952.

(7) Appel, S. B.; Fulton, L. A.; and Orr, K. D.: Observations on essentially normal young men treated with ACTH and cortisone. II. Effects on Tuberculin, Dick and Schick Tests. Armed Forces M. J. 3: 373-384, Mar. 1952.

22 subjects in the cortisone group for 16.9 days, and the 26 subjects in the control group for 13.3 days prior to hormone therapy. The dietary intake was unrestricted and contained excessive quantities of candy bars and soft drinks. Four subjects (2 in each hormone therapy group) were placed on moderate fluid and candy intake, but the regular ward diet was continued.

Twenty mg. of ACTH was given in 1 liter of 5 percent dextrose in water or saline solution or in normal saline solution alone, daily over a 6-hour period for 31 consecutive days. Cortisone was given by mouth as follows: 400 mg. (100 mg. every 6 hours) for 1 day; 300 mg. (75 mg. every 6 hours) on the second day; 200 mg. (50 mg. every 6 hours) until the twelfth day at which time 200 mg. (100 mg. at 0800 and 2000) was given daily through the thirty-first day.

Daily clinical observations were made. The subjects were questioned specifically regarding personal or familial tuberculosis, diabetes, and neuropsychiatric illnesses. The length of time in combat, and the incidence of previous combat wounds were noted. There was no significant difference between the groups. Clinical observations included evaluation of psychiatric state, acne, moon face, hirsutism, pigmentation (especially around old scars), striae, arterial blood pressure determinations, roentgenograms of the chest and extremities, routine complete blood count, eosinophil counts *(6)*, urinalyses, and glucose tolerance tests *(6)*. Until the twelfth day of therapy most subjects had not been weighed regularly, but from this day until 3 days after therapy all subjects were weighed daily prior to breakfast.

TABLE 1. *Frequency distribution of side effect*

	ACTH group	Cortisone group	Total
Moonface	6	13	19
Glucose intolerance	4	11	15
Hypertension	3	12	15
Acne	2	2	4
Hirsutism	1	2	3
Edema	1	2	3
Psychic changes	0	1	1
Total	17	43	60

RESULTS

Table 1 presents the frequency distribution of side effects in order of incidence. Table 2 shows an arbitrary index of side effects wherein a maximum score of 7 might be assigned each subject. The mean indexes of the groups are comparable.

TABLE 2. *Index of side effects**

Group	Index rating							Total	Total rating	Average rating index
	0	1	2	3	4	5	6	7		
ACTH	4	3	6	1	-	-	-	-	14	18	1.3
Cortisone	2	7	6	5	2	-	-	-	22	42	1.9
Total	6	10	12	6	2	-	-	-	36		
Percent of total	17	28	33	17	5	-	-	-	100		

*The following signs were assigned a unit value of 1: moonface, hypertension (over 140/90), glucose intolerance, acne, hirsutism, edema, psychic changes.

TABLE 3. *Change in mean arterial blood pressure and diuresis observed 24 hours after giving a mercurial diuretic*

ACTH and cortisone group						Control group		
With moonface			Without moonface					
Subject	B. P.	Urine volume (ml.)	Subject	B. P.	Urine volume (ml.)	Subject	B. P.	Urine volume (ml.)
56*	-28	8500	22	-19	4200	33	-15	2700
59**	-14	6000	23	- 5	1500	42	- 8	1600
16	-19	2000	26	- 1	2850	39	- 3	2100
6*	-16	2500	12	+10	2700	41	- 1	3250
17	- 9	2100	1*	+12	2500	35	+10	1800
25	- 4	1900						
Mean	-15	3833	-	-0.6	2750	-	-3.4	2290
Standard error	3.38	1140	-	4.24	410	-	4.09	310

*ACTH subjects.
**Subject 59 received 2 injections; results were recorded after 48 hours.

Moonface was noted in 35 percent of the ACTH group and 56 percent of the cortisone group. The average time after onset of therapy at which this sign was definitely noted was 16 days. Several photographs were made to provide an objective means of recording its time of disappearance after discontinuing therapy, but this could not be determined accurately up to 30 days after therapy when the subjects were transferred to another hospital. In an effort to estimate the role of edema fluid in contributing to the moonface appearance, subjects were given 1 ml. of a mercurial diuretic intramuscularly, and the subsequent 24-hour urine output was measured (table 3). No significant alteration in facial contour or in diuresis volume was noted.

TABLE 4. *Mean arterial blood pressures*

Day of treatment	ACTH group	Cortisone group	Control group
9	95.1 ± 4.24*	–	–
11	102.5 ± 9.12	109.5 ± 1.55*	–
12 (a. m.)	100.1 ± 2.88	104.9 ± 2.49	97.7 ± 0.56*
12 (p. m.)	105.2 ± 3.52	–	–
13	97.8 ± 4.21	–	–
18 (p. m.)	102.0 ± 2.87	102.1 ± 1.82	93.8 ± 2.39
24	97.4 ± 3.49	107.3 ± 2.38	91.8 ± 2.04
26	99.5 ± 3.57	102.3 ± 2.62	89.8 ± 1.37
30 (p. m.)	104.1 ± 2.40	107.9 ± 3.11	–
Day after treatment			
1	101.5 ± 3.05	104.7 ± 2.54	92.4 ± 1.55
3	93.3 ± 3.44	–	–
6	94.5 ± 2.99	98.7 ± 1.96	–
11	89.0 ± 3.56	96.5 ± 1.87	–

*Standard error

The mean arterial blood pressure was calculated from the charted records of the systolic and diastolic pressures by averaging the 2 values (table 4). Considering means separated by more than 2 standard errors (P less than 0.05), it was found that the ACTH group showed significant elevation in blood pressure on the eighteenth and thirtieth days, and the cortisone group, on the twelfth, eighteenth, twenty-fourth, and twenty-sixth days.

The incidence of hypertension (blood pressure over 140/90 on at least 2 separate days) was 21 percent in the ACTH group and 52 percent in the cortisone group (table 1). On 3 occasions the blood pressure was determined at the mid-point of the daily ACTH 6-hour infusion (total volume of 1,000 ml.), and no significant change was noted (p. m. readings in table 4). The highest systolic blood pressure reading observed during therapy was 178, but the hypertensive systolic blood pressures ranged usually between 140 and 160. The maximum

elevated diastolic determination was 112, but they usually ranged between 90 and 100.

An interesting observation was noted in analyzing the individual change in mm. mercury in the blood pressure at 0 and 24 hours after the injection of a mercurial diuretic, comparing the hormone subjects with and without the moonface sign (table 3). The hormone subjects with moonface showed a significantly greater fall in arterial blood pressure (the critical ratio was 2.66; P was 0.007).

In one subject (ACTH 56) ACTH therapy was discontinued because of undesirable side effects. This 20-year-old Negro was admitted 5 days after incurring fourth degree frostbite of both lower extremities up to the level of the malleoli (cold and edematous tissues distal to the ankles). Heparin infusions were administered every 4 hours and each contained 3.3 mg. of ACTH (20 mg. daily). His blood pressure on admission was 122/88. His appetite for food, candy, cookies, sardines, and soft drinks was excessive. On the eleventh day of therapy generalized edema was noted. He had moderate dyspnea, tachycardia, and hypertension (his blood pressure was 160/104). Rales were present at the base of both lungs. A roentgenogram of the chest was normal. ACTH therapy was discontinued and 1 ml. of a mercurial diuretic was given intravenously. There was a diuresis of 8,500 ml. during the ensuing 24 hours, and the blood pressure fell to 124/84 with general improvement. This subject represented one of the most severe instances of frostbite seen at the Cold Injury Section.

Two other subjects in the ACTH group (57 and 58) were weighed on admission, at which time their blood pressure was normal. They were instructed to ingest the ward diet without additional salt and to take not more than 1 bottle of soft drink and 1 candy bar daily. No rapid weight gain was noted, nor was hypertension observed during their course of therapy.

Two cortisone subjects (59 and 60) developed peripheral edema and hypertension 6 and 5 days respectively after therapy was started. Subject 59, an intelligent 38-year-old sergeant with 18 years of service, exhibited a hypomanic state with rapid flow of thought and speech. He retained insight and expressed feelings of restrained tension as if he "would jump out of his skin." He received an injection of 1 ml. of a mercurial diuretic on the eleventh and again on the twelfth day of therapy with resulting weight loss of 11 pounds and diuresis of 6,000 ml. His blood pressure readings and psychic state became normal and his edema disappeared. Subject 60 received no diuretic but was advised to restrict his fluid, candy, and salt intake on the ninth day of therapy. His weight on admission (152 pounds) had increased to 178 pounds on that day. On the restricted intake it dropped to 170 pounds within 6 days and remained at that level. His blood pressure remained elevated (systolic from 142 to 154 and diastolic from 86 to 100) until cortisone was discontinued.

Glucose tolerance was altered during therapy in 4 of the 13 ACTH subjects (31 percent) in whom tolerance tests were performed and in 13 of the 20 cortisone subjects (65 percent). These results are reported in detail elsewhere (6). No glycosuria was observed during any of the 3-hour glucose tolerance tests. One cortisone subject (59) gave a familial history of diabetes mellitus (maternal grandmother and cousin). During hormone therapy he manifested hypertension, psychic changes, and edema, but no abnormality in glucose tolerance on the fifteenth and twenty-fourth days of therapy.

ACTH infusions given intravenously resulted in significant elevation of the fasting blood glucose and abolished the 2- and 3-hour fall in glucose level after ingestion of an oral dose of glucose (100 gm.). No glycosuria was observed during either of these periods.

Mild facial and upper thoracic seborrheic and acneform lesions were observed in 2 subjects in each hormone group during therapy. These subjects denied previous recent acne and exhibited no similar skin lesions prior to therapy. The 2 ACTH subjects also had impaired glucose tolerance. One cortisone subject had no other side effects, but the other subject had impaired glucose tolerance, moonface, and hypertension.

Mild facial hirsutism was noted by 1 ACTH subject and 2 cortisone subjects. At first these subjects remarked on the quality of their razor blades and then realized that their beards were growing more rapidly.

One ACTH subject and 2 cortisone subjects developed pitting edema as described above. Rapid weight gains were observed in all subjects, including the control group, and were attributed to the change from active combat to the restrictions of almost absolute bed rest. Because accurate control weights were obtained before starting treatment in only a few of the subjects, the differentiation of real weight gain from subclinical edema accumulation could not easily be determined until clinical edema appeared. The subjects with moonface were especially conscious of marked weight increase. Practically all the subjects had lost weight during combat; estimations of from 10 to 30 pounds weight loss were common in those who had been in combat for a few months or longer.

No definite weight loss was observed in the treated groups after cessation of therapy. No evidence of asthenia, weakness, or hypopotassemia was noted during hormone therapy or after its abrupt discontinuance. No gross evidence of adrenal insufficiency was observed after cessation of hormone therapy.

Laboratory evidence of relative adrenal insufficiency was demonstrated after cessation of ACTH therapy by flattened glucose tolerance curves in 5 of 11 subjects tested on the seventeenth day (6). Two of these subjects were tested again 1 week later and had normal curves.

Three of 20 subjects in the cortisone group showed slight flattening of the glucose tolerance curve on the sixteenth day *after* therapy (6).

The results of the eosinophil response to ACTH given intravenously have been described elsewhere (6). Eighty percent of the cortisone subjects failed to show an eosinopenia of over 50 percent on the third day *after* therapy; 63 percent, on the tenth day *after* therapy. By the twenty-third day, 15 of 19 cortisone subjects (79 percent) had demonstrated satisfactory eosinopenia.

Eosinophil response to 100 mg of cortisone by mouth was determined (6) in the cortisone and control group on the nineteenth day *after* therapy. Nine of 20 cortisone subjects (45 percent) and 7 of 10 control subjects (70 percent) showed an eosinopenia of more than 50 percent. The difference is not statistically significant (the critical ratio was 1.8; P was 0.07).

Psychiatric manifestations were exhibited by only 1 subject (cortisone 59), as described above. Although most of the subjects had been through severe emotional stresses in combat for an average of 16 weeks there was no greater incidence of restlessness, insomnia, or nightmares in the treated groups as compared to the control group. No remarkable euphoria was noted in those treated as compared to the control subjects.

The effects of ACTH and cortisone on the healing of frostbite lesions will be reported elsewhere (8), but this type of lesion lends itself particularly to a clinical estimation of altered blood coagulation in man as a result of hormone therapy (9). An increased tendency to thrombosis in the smaller blood vessels would have decreased the circulation through the vascular tree of the affected extremities already damaged by frostbite. No increased tendency to thrombosis was noted in the treated groups.

No untoward effects were observed during the rapid or the slow ACTH infusion. Cortisone given by mouth induced no symptoms referable to gastrointestinal irritation.

DISCUSSION

The appearance of moonface was frequently noted in this study. Edema of the soft tissues seems to contribute but little to producing this sign which has been attributed to thickening of the buccal fat pads. The disappearance of this sign in most subjects was not observed during the 30-day posttreatment period. Giving a mercurial diuretic induced a significant fall in blood pressure in those subjects

(8) Orr, K. D.: Unpublished observations.

(9) Smith, R. W.; Margulis, R. R.; Brennan, M. J.; and Monto, R. W.: Influence of ACTH and cortisone on certain factors of blood coagulation. Quoted by Bunim, J. J.: Clinical effects of cortisone and ACTH on rheumatic diseases. Bull. New York Acad. Med. 27: 75-100, Feb. 1951.

with moonface as compared to hormone-treated subjects without moonface and control subjects.

Relative and absolute hypertension were commonly noted in the hormone-treated groups and reverted to normal within 2 weeks of the discontinuance of therapy. No significant increase in blood pressure was observed during the daily 6-hour ACTH infusions.

Peripheral edema was observed in only a few subjects. It responded rapidly to fluid and salt restriction and/or the giving of a mercurial diuretic. Daily weighing is a simple and reliable indicator of fluid retention. Moderate salt and fluid intake restrictions may prevent the development of undesirable degrees of edema formation.

Mild changes in glucose tolerance were noted in one third of the ACTH and two thirds of the cortisone subjects. No glycosuria was observed. The difference in incidence of glucose intolerance *(6)* in these two groups was not statistically significant. Subjects who show "diabetogenic responses" during ACTH therapy respond similarly during cortisone therapy *(10, 11)*.

Although the use of ACTH intravenously potentiates its action approximately tenfold *(12)*, the duration of this adrenal cortical stimulus was probably not greater than 8 hours *(6)* in the ACTH subjects. In a previous study *(13)* when ACTH was administered intravenously to 2 normal subjects, 50 and 100 mg. of ACTH were infused in 30 and 60 minutes respectively. No increase in fasting blood glucose was observed until food was ingested 6 hours later; hyperglycemia and glycosuria persisted for 3 hours. Three hours later hyperglycemia appeared after another meal, but glycosuria was not detected.

In 10 normal subjects *(14)* treated with 50 or 100 mg. of ACTH daily in divided doses intramuscularly, hyperglycemia and diabetic glucose tolerance tests began to appear in 24 hours in 9 of the subjects, and glycosuria (from 2 to 50 gm. daily) was noted in all of the subjects. The ACTH preparation, intramuscular route, and dosage employed were similar to those used by other investigators who treated large groups of patients *(3-5, 10, 12, 15)* and who did not observe frequent

(10) McEwen, C.; Bunim, J. J.; Baldwin, J. S.; Kuttner, A. G.; Appel, S. B.; and and Kaltman, A. J.: Effect of cortisone and ACTH on rheumatic fever. Bull. New York Acad. Med. 26: 218-228, 1950.

(11) Conn, J. W.: ACTH diabetes in man; the end organ versus adrenocortical response (abstract). J. Clin. Endocrinol. 10: 825, July 1950.

(12) Talbott, J. H.: Personal communication.

(13) Sayers, G.; Burns, T. W.; Tyler, F. H.; Jager, B. V.; Schwartz, T. B.; Smith, E. L.; Samuels, L. T.; and Davenport, H. W.: Metabolic actions and fate of intravenously administered adrenocorticotropic hormone in man. J. Clin. Endocrinol. 9: 593-614, July 1949.

(14) Conn, J. W.: Effects of ACTH on carbohydrate metabolism in normal human beings. In Mote, J. R. (editor): Proceedings of the First Clinical ACTH Conference. The Blakiston Company, Philadelphia, Pa., 1950. pp. 86-107.

(15) Bunim, J. J.: Clinical effects of cortisone and ACTH on rheumatic disease. Bull. New York Acad. Med. 27: 25-100, Feb. 1951.

"diabetogenic response." The discrepancy in results is only partially attributable to the more frequent performance of glucose tolerance tests by Conn *(14)*.

The development of mild acne in a few subjects may have been unrelated to hormone therapy and was not a serious side effect. Mild hirsutism was likewise not a serious clinical problem. No increased skin pigmentation was observed during ACTH or cortisone therapy.

No asthenia during hormone therapy, after mercurial diuresis or after abrupt cessation of hormone therapy was observed. No gross evidence of adrenal insufficiency was noted following discontinuance of therapy. Flattened glucose tolerance curves were demonstrated by several subjects 2 weeks after discontinuance of therapy. The eosinophil response to ACTH was diminished in 80 percent of the cortisone subjects on the third day *after* therapy; in 63 percent on the tenth day. By the twenty-third day, 4 of the 19 subjects still failed to show a 50 percent or greater eosinopenia. The eosinopenic effect of cortisone has been described as being of lesser magnitude and constancy than that of ACTH *(5)*. Cortisone given orally, however, induced an eosinopenia of over 50 percent in 7 of 10 control subjects but in only 9 of 20 cortisone subjects on the nineteenth day *after* therapy. The failure of the cortisone group to manifest a higher incidence of eosinopenia after cessation of therapy may have been due to increased tolerance to cortisone in these subjects similar to the eosinophil "escape phenomenon" previously reported.

CONCLUSIONS

During ACTH and cortisone therapy the following so-called side effects were noted in order of frequency: moonface, impaired glucose tolerance, hypertension, acne, hirsutism, edema, psychic changes. Eighty-three percent of a group of 36 essentially normal young men treated with substantial amounts of ACTH and cortisone for 31 consecutive days showed at least one side effect. The side effects disappeared after therapy in all instances and necessitated cessation of hormone administration in only 1 instance. No untoward reactions were observed during the rapid or slow intravenous administration of ACTH. Cortisone given orally produced no untoward gastrointestinal manifestations or different effects from intramuscularly administered cortisone. The common occurrence in essentially normal young men of impaired glucose tolerance and other so-called side effects indicates pharmacologic effects with moderate individual variation dependent on dosage and duration of therapy rather than significant variation in end-organ response.

The Use of ACTH in Dermatoses

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MY PURPOSE in this article is to summarize the results of treating certain dermatoses with ACTH given intravenously. The patients reported on were ward and private patients at the Hospital of the University of Pennsylvania and the Skin and Cancer Hospital of Philadelphia. These were unselected patients and this method of treatment was used as a life-saving measure, in an effort to bring about a remission in the more serious diseases, or with the hope of terminating prolonged and expensive hospitalization.

Hench (2), Brunsting et al. (3), Elkinton et al. (4) and many others have shown that the steroid hormones, particularly cortisone, have a beneficial effect on rheumatoid arthritis and other "collagen diseases." There have been many reports of the use of cortisone and ACTH in the treatment of various dermatoses (5-9) and allergic states (10), sometimes

(1) Fellow, Department of Dermatology and Syphilology, University of Pennsylvania School of Medicine.

(2) Hench, P. S.: Introduction: cortisone and ACTH in clinical medicine. Proc. Staff Meet., Mayo Clin. 25: 474-476, Aug. 16, 1950.

(3) Brunsting, L. A.; Slocumb, C. H.; and Didcoct, J. W.: Effects of cortisone on acute disseminated lupus erythematosus. Proc. Staff Meet., Mayo Clin. 25: 479-482, Aug. 16, 1950.

(4) Elkinton, J. R., et al.: In Mote, J. R.: Proceedings of the First Clinical ACTH Conference. The Blakiston Co., Philadelphia, Pa., 1950. p. 429.

(5) Cannon, A. B., et al.: Pituitary adrenocorticotropic hormone (ACTH) and cortisone in diseases of skin. I. Pemphigus vulgaris and other bullous dermatoses. J. A. M. A. 145: 201-206, Jan. 27, 1951.

(6) Bayles, T.; Stout, C.; and Stillman, J. S. A.: In Mote, J. R.: Proceedings of the First Clinical ACTH Conference. The Blakiston Co., Philadelphia, Pa., 1950. p. 447.

(7) Sulzberger, M. B., et al.: Effects of ACTH and cortisone on certain diseases and physiologic functions of skin: I. Effects of ACTH. J. Invest. Dermat. 16: 323-337, May 1951.

(8) Wammock, V. S.; Biederman, A. A.; and Jordan, R. S.: Erythema multiforme exudativum (Stevens-Johnson syndrome): report on patient treated with pituitary adrenocorticotropic hormone. J. A. M. A. 147: 637-639, Oct. 13, 1951.

(9) Frazier, C. N., et al.: Effect of adrenocorticotropic hormone (ACTH) and cortisone on several varieties of pemphigus. J. Invest. Dermat. 17: 55-60, Aug. 1951.

(10) Randolph, T. G., and Robbins, J. P.: In Mote, J. R.: Proceedings of the First Clinical ACTH Conference. The Blakiston Co., Philadelphia, Pa., 1950. p. 479.

with dramatic, although usually temporary, improvement. Thorn *(11)* has stated that ACTH in stimulating the adrenal cortex causes the production of compound F (17-hydroxycorticosterone), cortisone (17-hydroxy-11-dehydrocorticosterone), compound B (corticosterone), and possibly compound A (11-dehydrocorticosterone) and 11-desoxycorticosterone. Because of its stimulation of the adrenal cortex and the subsequent production of these steroid hormones, ACTH has been equally useful in treating the various conditions which show improvement following therapy with these hormones. It is theoretically more physiologic to use ACTH rather than substitution therapy with cortisone.

Using the clinical response of the patient and certain laboratory studies as an additional guide, the dose of ACTH given intramuscularly usually ranged from 40 to 200 mg. in divided doses over a 24-hour period. The reported symptomatic relief of such diseases as dermatomyositis *(4)*, pemphigus *(9)*, and acute or subacute disseminated lupus erythematosus *(3)*, was such that the use of this hormone is indicated as an aid in bringing about a remission in these diseases. Because the cost of the medication was high and the time during which it was effective in the control of symptoms was relatively short, it was highly desirable to find a way in which ACTH could be administered less frequently and in smaller amounts. Accordingly, when it was found that ACTH could be given by intravenous infusion over a 6- to 8-hour period with the same apparent beneficial effect for at least 48 hours *(12, 13)*, and in a dose a great deal less than the usual daily intramuscular dose, it was decided to try this mode of administration on patient 1.

The usual method of administration was to give 25 mg. of ACTH in 1,000 cc. of 5 percent dextrose in distilled water by intravenous infusion over about 8 hours. Because patient 1 was a mild diabetic (controlled with 15 units of protamine zinc insulin daily), it was decided to substitute normal saline solution for the dextrose solution with close observation of the electrolyte and water balance. The results are shown in table 1.

DISCUSSION

Just as with ACTH given intramuscularly, most of the patients showed improvement, but except for erythema multiforme and the eczematous dermatoses (patients 6, 11, 13) there were no cures. Two patients with pemphigus were able to return home in a state of fairly complete remission, but they still relapse unless the drug is administered at least

(11) Thorn, G.: In Harrison, T. R.: Principles of Internal Medicine. The Blakiston Co., Philadelphia, Pa., 1950. p. 589.

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(13) Mandel, W., et al.: Intravenous use of pituitary adrenocorticotropic hormone (ACTH); report on its administration in 25 patients. J. A. M. A. 146: 546-551, June 9, 1951.

TABLE 1. *Results of treatment with ACTH in 16 patients with dermatoses*

Patient	Age (years)	Sex	Diagnosis	Duration	Result of therapy	Remarks
1	48	F	Pemphigus erythematosus	6 mo.	Remission	Remained in remission for 6 months with ACTH given intravenously 3 times weekly. No ACTH was given for 3 weeks in July 1951, and patient relapsed in about 8 days.
2	59	M	Pemphigus vulgaris	3 wk.	Partial remission	Able to return home and gets only occasional bulla on ACTH infusions 3 times weekly.
3	60	M	Pemphigus vulgaris	3 mo.	Died	Showed slight improvement during the first week but died 30 days after admission.
4	26	F	Diffuse scleroderma with acrosclerosis	10 yr.	Improved	The patient, a Negress, showed noticeable softening and relaxing of skin of face, neck, chest, and forearms. Maintained most of improvement with subsequent physiotherapy.
5	43	M	Diffuse scleroderma with acrosclerosis	10 yr.	Much improved	Went home with 75 percent improvement of face and shoulder girdle and 25 percent improvement of fingers and hands.
6	45	M	Contact dermatitis	9 wk.	Marked improvement	Job required contact with carbon tetrachloride, turpentine, gasoline, soldering materials, and greases. Skin normal except for residual erythema on discharge from hospital.

TABLE 1. *Results of treatment with ACTH in 16 patients with dermatoses*—Continued

Patient	Age (years)	Sex	Diagnosis	Duration	Result of therapy	Remarks
7	47	F	Localized myxedema	3 mo.	Unimproved	Patient had exacerbation of lesions after 1 intravenous infusion of ACTH.
8	60	M	Mycosis fungoides (erythroderma)	1 yr.	Unimproved	Patient showed relief of pruritus for about 8 hours after each ACTH infusion. No change in skin lesions.
9	40	M	Mycosis fungoides	7 yr.	Unimproved	Had some temporary relief of pruritus and burning sensation in erythematous plaques.
10	17	F	Atopic dermatitis	17 yr.	Unimproved	Had dry, lichenified skin prior to ACTH infusions. Developed pustules of face and arms after 2 infusions.
11	37	F	Infectious eczematoid dermatitis	15 mo.	Improved	Had almost complete remission on cortisone therapy. Was given ACTH infusions as final stimulus to adrenal cortex. Was in remission 2 months later.

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TABLE 1. *Results of treatment with ACTH in 16 patients with dermatoses*—Continued

Patient	Age (years)	Sex	Diagnosis	Duration	Result of therapy	Remarks
12	56	M	Psoriasis	9 yr.	Unimproved	Moderate clearing while getting ACTH infusions, but had relapse shortly after termination of treatment.
13	66	M	Vesicular contact dermatitis	3 mo.	Much improved	Had resistant dermatitis medicamentosa (contact). Remission occurred as a result of ACTH infusions.
14	52	M	Erythema multiforme	18 mo.	Much improved	Remission of skin lesions following ACTH infusions. Basic disease undetermined but provisional diagnosis was periarteritis nodosa.
15	33	F	Erythema multiforme	6 days	Much improved	Complete remission of lesions after second series of ACTH infusions. Partial relapse after first series.
16	47	M	Exfoliative dermatitis medicamentosa	1 mo.	Much improved	Dermatitis was result of gold therapy. This was treated with BAL. Given cortisone for arthritis with urticarial and eczematous relapse. Improved after ACTH infusions.

twice weekly. Patient 3 died while under ACTH therapy. Two patients with diffuse scleroderma with acrosclerosis showed improvement. Two patients with mycosis fungoides experienced moderate relief from their pruritus, but otherwise showed no response to the drug. The patients with psoriasis, atopic dermatitis, and localized myxedema were made worse as a direct result of treatment.

The more common side effects reported by Behrman and Goodman *(14)* such as acneform eruptions, hirsutism, rounded face (moon face), striae atrophicans, delayed wound healing, hyperglycemia, sodium retention, and edema were generally lacking in these patients. Patients 1 and 2 had pigmentation at the site of previous lesions, and case 15 developed a moderate moon face. While under therapy patient 1 was able to discontinue insulin and be maintained free of glycosuria with moderate carbohydrate restriction of her diet. This patient, who was given ACTH intravenously for about 6 months, no longer shows an eosinophil response or an increase in the urinary 17-ketosteroids following a dose of ACTH, but she will still relapse if ACTH is not administered. Thus, although the adrenal cortex apparently is not responding to ACTH, the hormone still maintains the patient in remission.

It is highly desirable to have a number of laboratory studies before and during therapy. Base-line studies prior to therapy should ordinarily include fasting (or 2 hour p. c.) blood sugar, plasma potassium and sodium levels, sedimentation rate, and an eosinophil count. A roentgenogram of the chest, body weight, and blood pressure also should be recorded. During treatment another eosinophil count 4 hours after the first infusion may be helpful in showing adrenal response. A daily record should be kept of body weight, blood pressure, and urinalysis, and the other studies should be repeated at intervals, particularly if any adverse side effects are suspected. Some of the serious complications which may occur are activation of a latent tuberculous lesion, pneumonia, pulmonary edema, and/or secondary infection. The fever or other signs may be masked by the ACTH. Sodium intake should be restricted, although in our patients no difficulty was encountered as far as sodium and fluid retention or severe dependent edema were concerned. The patient may be used as his own control by giving the intravenous infusion without the ACTH. This was done on several occasions, although generally ACTH therapy was not withheld because the patients were buying the medication, often in order to hasten recovery and thereby terminate hospitalization.

There are certain advantages of intravenous administration of ACTH. The cost of using the drug is greatly reduced, because one 25 mg. dose every 48 hours has the same apparent symptomatic effect as from 200 to 400 mg. given intramuscularly in divided doses over a like period. Although the lower dosage seems to avoid many of the undesirable side

(14) Behrman, H. T., and Goodman, J. J.: Skin complications of cortisone and ACTH therapy. J. A. M. A. 144: 218-221, Sept. 16, 1950.

effects, there are disadvantages which should be considered. It is extremely tedious for the patient to lie quietly for 8 hours while the infusion is being given. There is danger of an anaphylactoid reaction, which has been reported by Forsham *(15)* as occurring during intramuscular use, and which could occur with disastrous results during intravenous administration. Forsham's 2 patients rapidly recovered with the administration of epinephrine, but it would be imperative that the physician be present and prepared to cope with such an emergency as soon as symptoms or signs occurred. There are also the dangers of any other mode of administration of ACTH; such as the activation of a tuberculous focus *(16)*, masking of pneumonia or secondary infection, and an adverse reaction to the drug itself, such as was recently reported by Cohen and Distelheim *(17)*. Habif et al. *(18)* have reported a patient with perforated duodenal ulcer following ACTH therapy. Turner and Hollander *(19)* have shown that cortisone has a deleterious effect on experimental syphilis and believe that it would be unwise to give cortisone to patients with active syphilis. Forsham *(20)* believes that it would be equally unwise to use ACTH in patients with this disease. A final disadvantage is the large number of laboratory studies which should be performed before and during ACTH therapy. In an effort to anticipate and prevent the complications described, the routine blood counts, urinalysis, serologic test for syphilis, and roentgenogram of the chest, must be supplemented by fasting blood sugar, plasma sodium and potassium levels, serum protein, and eosinophil counts.

SUMMARY

Sixteen patients with diseases involving the skin were treated by slow intravenous infusions of ACTH. One patient with pemphigus vulgaris died, and lack of improvement or relapse of the skin disease was noted in the patients with mycosis fungoides, psoriasis, atopic dermatitis, and localized myxedema. Improvement was noted in 2 patients with pemphigus, 2 with erythema multiforme, 2 with scleroderma, and 4 with eczematous skin diseases.

It is concluded that essential laboratory studies should include a roentgenogram of the chest, serologic test for syphilis, fasting blood sugar, plasma sodium and potassium levels, serum protein, and an eo-

(15) Forsham, P. H.: In Mote, J. R.: Proceedings of the First Clinical ACTH conference. The Blakiston Co., Philadelphia, Pa., 1950. p. 489.

(16) Fred, L., et al.: Development of active pulmonary tuberculosis during ACTH and cortisone therapy. J. A. M. A. 147: 242-246, Sept. 15, 1951.

(17) Cohen, D., and Distelheim, I. H.: Generalized erythrodermia occurring in case of psoriasis on treatment with adrenocorticotropic hormone (ACTH). J. Invest. Dermat. 17: 61-63, Aug. 1951.

(18) Habif, D. B.; Hare, C. C.; and Glaser, G. H.: Perforated duodenal ulcer associated with pituitary adrenocorticotropic hormone (ACTH) therapy. J. A. M. A. 144: 996, Nov. 18, 1950.

(19) Turner, T. B., and Hollander, D. H.: Cortisone in experimental syphilis; preliminary note. Bull. Johns Hopkins Hosp. 87: 505-509, Nov. 1950.

(20) Forsham, P. H.: Present status of ACTH and cortisone in therapy. M. Clin. North America 35: pp. 1229-1253, Sept. 1951.

sinophil count. The eosinophil count should be repeated 4 hours after the first dose of ACTH.

Serious complications which may occur include allergic manifestations to ACTH, activation of tuberculosis or syphilis, perforation of a viscus, masking of an acute infection, and any of the usual side effects of adrenal cortical hypersecretion.

The cost of maintaining the patient in remission is much less when ACTH is given intravenously because when using this method of administration less hormone is required than when it is given intramuscularly. This method has the further advantage that there are apparently fewer side effects with the reduced dosage.

BOOK REVIEW

Electrocardiographic Studies in Normal Infants and Children, by *Robert F. Ziegler,* M. D., Associate in Cardiology, In Charge of Section of Pediatric Cardiology, Henry Ford Hospital, Detroit, Mich. 207 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $10.50.

This is a masterful report of data and statistical interpretation thereof, gathered in a comprehensive study of the ECG's of 550 normal children ranging in age from birth to 16 years. The material was carefully selected in that only children who had a completely negative cardiac history, a normal heart size, and an absence of significant murmurs were chosen. Even the possibility of undetected congenital heart disease was excluded by carefully following all infants up to 2 years of age. The work was done on a direct-string research-type electrocardiograph with mechanical sources of error carefully controlled. The book contains an extensive bibliography and an adequate index. The illustrations are superbly reproduced, the explanation detailed, and the data exhaustively complete. The report is a monumental piece of authoritative work on the measurements and interrelationships of the various components of the normal ECG in children. The book is naturally of restricted interest being primarily a reference volume for those seeking authentic statistical background on the subject. It will undoubtedly be on the shelf of every medical reference library as well as in every cardiologic laboratory.

—*Col. C. L. Leedham, MC, U. S. A.*

Direct Technic in Making Three-Quarter Crown and Full Crown Wax Patterns

Kunio Suzuki, *Captain, U. S. A. F. R. (DC)*

EVERY dentist has a technic which he prefers for forming and carving wax patterns for full-cast crowns, three-quarter crowns, and class 4 inlays. In making wax patterns he tries to achieve accuracy of the pattern with a minimal expenditure of time. Many regard the indirect method of making a full crown and three-quarter crown wax pattern as the most satisfactory technic. The simplest wax pattern to make is that for a one-surface cavity preparation. As the number of surfaces involved increases the procedure becomes more difficult and the dentist becomes more concerned about the success of producing an accurate, direct wax pattern. Basically, the problem is one of being able to bring and confine the softened wax to the proper margins and shape while conserving operating time.

The preparation of the tooth should be the standard three-quarter crown or full crown preparation. I have found, however, that preparations with a shoulder in the gingival margin area are much more satisfactory than the tapered type of preparation. It is always better to have a flush margin than an overlapping margin for a gold crown.

Celluloid crown forms. By the use of commercial types of celluloid crown forms as a matrix, accurate direct wax patterns can be produced in a minimal length of time.

Technic for making three-quarter crown wax pattern.

1. Select the celluloid crown form best adapted for shape and gingival contour.

2. Trim the celluloid crown form with scissors to conform to the gingival area of the prepared tooth. Place the crown form on the tooth and see that it fits snugly *but without tension.* If the crown form is a little too large mesiodistally, press a heated wax spatula gently against the mesial or distal portion of the celluloid crown to reduce the size. Do not overheat the spatula as this will melt the celluloid.

3. After the crown form has been fitted, place it on the prepared tooth and check the bite.

4. Remove the facial surface of the celluloid crown, leaving 1 or 2 mm. of the celluloid overlapping the margin of the tooth preparation.

5. Lubricate the inner surface of the celluloid crown form with cocoa butter, petrolatum, or oil evenly and thinly.

6. Melt inlay wax over a flame and place the melted wax, drop by drop, inside the celluloid form, and force over the prepared tooth to the desired position. Chill the wax with cold water.

7. Cut the incisal margin of the celluloid matrix with sharp-nosed scissors. Usually only 2 cuts are required—one toward the disto-incisal and the other toward the mesio-incisal angle.

8. Chill a wax spatula and work between the celluloid and wax, removing the celluloid, while the wax remains on the tooth.

9. Heat the spatula and burnish the margins of the wax pattern.

10. Carve the wax pattern, and sprue it in the mouth.

11. Tease the pattern off the tooth and invest. If the gingival part of the wax pattern does not extend as far gingivally as is desired, melt wax onto the pattern on the tooth with a heated spatula. By careful manipulation, work the wax to the underextended area and carve the wax pattern as required.

The same technic is used in making wax patterns for complex cavity preparations.

Technic for making full crown wax pattern.

1. Select the proper celluloid crown form and trim it to fit the gingival margin of the prepared tooth.

2. Place the celluloid crown form on the tooth and have the patient close his mouthly gently.

3. Trim the peripheral margin of the matrix until proper occlusion is obtained without impinging too much on the gingivas. When there is excessive cuspal prominence, a warm-to-hot wax spatula applied to the cusp of the celluloid crown form will reduce the prominence.

4. After the celluloid crown form has been properly fitted and adapted, bore a hole in the occlusal of the crown form, and place melted wax in it to the desired level.

5. Place the crown form with wax on the tooth. When the crown has been placed about three-fourths of its way over the prepared tooth, place a finger over the hole in the crown form and force the crown to its proper position.

6. Have the patient bite down slowly on the crown. Note and correct any discrepancies.

7. Carve off the excess wax, chill it with water, and sprue the crown in the mouth hole in the celluloid. Remove the pattern from the tooth.

8. Dry the surface next to the sprue with air and add wax to make sure the pattern is fused to the sprue.

9. Follow regular steps in investing the wax pattern for casting. The celluloid will ignite and burn off when the casting ring is heated to the desired casting temperature.

Discussion. Proper tooth preparation is a prerequisite for the success of the wax pattern. Sometimes a crown form that fits the gingival margin is not available. When the crown form is too tight, pressure applied to the inner surface of the gingival portion of the crown with a warm spatula will widen its diameter. When a crown form fits in all dimensions except that it is too narrow mesiodistally, the usual procedure of fitting it and waxing the crown may be followed and the necessary correction may be made by adding wax to the pattern at the mesial and distal. By using the celluloid crown form matrix, there is very little carving to do. The crown form acts as a mold for the tooth being restored.

The advantages of this technic are that (1) a minimum of time is required to make a wax pattern, (2) discrepancies in the tooth preparation are corrected in the initial sitting, a step that obviates another sitting, (3) the material used is inexpensive, (4) the manipulation is simple, (5) very few instruments are required, (6) the wax patterns made are more accurate than those obtained by the indirect technic, (7) the transparency of the crown form makes it ideal for checking the thickness of the wax all around the tooth preparation, and (8) very little carving is required and the pattern has a smooth surface.

CONCLUSIONS

The most successful technic for making three-quarter crown and full crown wax patterns is the direct method. By using celluloid crown forms I have been able to get accurate wax patterns with a minimum of time and carving. It is a simple technic which does very little damage to the gingivas. The resulting gingival margins are more accurate than those obtained by the indirect method. The simplicity of the technic enables anyone to make a good wax pattern.

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Acute Diverticulitis of the Cecum[1]

Otto L. Churney, *Colonel, MC, U. S. A.*

John M. Wilson, Jr., *Captain, MC, A. U. S.*

ACUTE diverticulitis of the cecum is an uncommon disease usually simulating acute appendicitis in its symptoms and often resembling adenocarcinoma of the cecum at operation. Byrne et al. *(2)* in a recent article reporting 5 patients with this disease stated that the total number of cases of diverticulitis of the cecum reported was 126. It is our purpose to report an additional case.

CASE REPORT

On 22 November 1950, a 23-year-old soldier was admitted to this hospital complaining of anorexia, nausea, and pain in the right lower abdominal quadrant of 4 days' duration. On physical examination when first seen, there was moderate direct tenderness in his right lower abdominal quadrant, most severe over McBurney's point. There was no muscular spasm, no rebound tenderness, and no tenderness on rectal examination. The leukocyte count was 12,550 with 65 percent polymorphonuclear cells. The patient was observed for 3 days because of minimal findings on physical examination. During this time his tenderness persisted and his leukocyte count went up to 15,460 with 66 percent polymorphonuclear cells.

On 25 November he was operated on through a right McBurney incision. On opening the peritoneum, a normal appendix was found lying in front of the cecum. Just lateral to the base of the appendix a discrete round rubbery mass was felt in the cecal wall about 3.75 cm. in diameter and about 1.25 cm. thick. The incision was extended superiorly to give better exposure. The cecum was then opened through an incision superior and lateral to the mass and the mucosal side of the mass was inspected. An ulceration about 1 cm. deep with an opening 1.25 cm. in diameter leading into the mass was found. The lesion was considered to

(1) 279th Station Hospital, Berlin, Germany.

(2) Byrne, J. J.; Kallan, A. C.; and Bassett, A. A.: Acute diverticulitis of cecum; report of 5 cases. J. A. M. A. 144: 823-826, Nov. 4, 1950.

be benign. The distal end of the cecum including the appendix was resected with the line of the excision beginning medially about halfway between the appendiceal stump and the ileocecal valve and extending upward and laterally. The cecal wall was then closed in layers with catgut and silk. On completion of the closure an adequate lumen was present in the cecum and the ileocecal valve was unobstructed. The peritoneum and muscle were then closed and the skin and fascia were left open with untied retention sutures left in place. The wound was packed loosely with vaseline gauze and a dry sterile dressing was applied. Treatment with 300,000 units of penicillin b. i. d. and 0.5 gram of streptomycin b. i. d. was started.

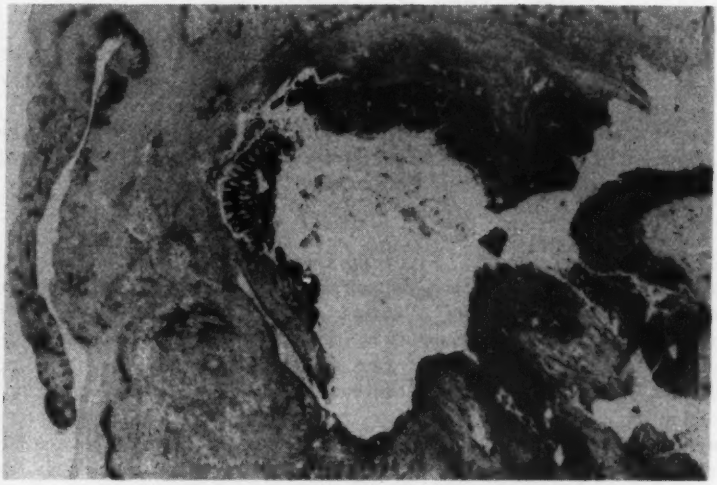

Figure 1. Acute diverticulitis of the cecum.

The skin and fascia were closed secondarily on the third postoperative day and a small vaseline wick was left in the wound. This was removed on the fifth postoperative day. On the twelfth postoperative day a barium enema showed narrowing of the lumen of the cecum near the ileocecal valve unassociated with obstruction. No diverticulums were seen in the large bowel. By the twentieth postoperative day the wound was completely healed and the patient was returned to duty on the twenty-ninth postoperative day. He received a total of 4,800,000 units of penicillin and 8 grams of streptomycin.

Pathologist's report. Near the base of the appendix there was a small ulcer in the mucosal surface of the cecum measuring 0.4 cm. in diameter. At this point the cecal wall was 2.1 cm. thick. The cut surface of the cecum showed a cyst about 1 cm. in its greatest diameter opening into the ulcer. The wall of the cyst was made up of fibrous tissue 0.4 cm. thick with surrounding subserosal fat which was edematous. At the

margin of the fibrous cyst wall the muscularis was interrupted and seen as scattered fibers. The serosal surface of the specimen was thickened, fibrotic, and hyperemic.

The microscopic examination revealed the cecal wall with an intramural cavity lined by a partially hypertrophied and edematous mucosa which was ulcerated in places. The floor of the ulcer was made up of granulomatous tissue with a fibrinous surface covered with cellular debris and lined by a bandlike area of leukocytes (fig. 1). The vessels and connective tissue fibers were directed toward the floor of the ulcer. Some scattered rests of muscle fibers and a diffuse infiltration of leukocytes, especially eosinophils and plasma cells were present within the granulation tissue. Some pigment-laden macrophages were noted. At one margin of the ulcer, there was a rodlike and fibrinoid area of necrosis in the submucosa underlying the marginal mucosa.

Several cross sections of the appendix showed the mucosa to be delicate. The lymphatic tissue was scarred with granulation tissue in places with enlarged lymph vessels engorged by lymphocytes and some leukocytes. The subserosa was edematous and hyperemic. Some vessels were surrounded by sheets of leukocytes. Necrotic areas covered with fibrinous membranes were seen in the serosa. A diagnosis of ulcerated intramural false diverticulum of the cecum and fibrinous periappendicitis was made.

COMMENT

In previously reported patients with this disease, the signs and symptoms have usually been those of an inflammatory lesion in the right lower abdominal quadrant, causing the preoperative diagnosis of acute appendicitis to be made. At operation on a patient with this disease when the inflammatory mass above the diverticulum is discovered, it is most important to make a differential diagnosis between the more commonly occurring carcinoma of the cecum and acute diverticulitis. Whereas the operation of choice in the former is a hemicolectomy, the procedure that is usually adequate in acute diverticulitis, is a local resection of the segment of cecum containing the diverticulum. Acute diverticulitis of the cecum occurs frequently enough to be considered in the differential diagnosis of pain in the right lower abdominal quadrant, particularly in patients who have had appendectomies, and in the differential diagnosis of masses in the cecal wall.

BOOK REVIEWS

Peptic Ulcer, Clinical Aspects, Diagnosis, Management. Editor: *David J. Sandweiss,* M. D., F. A. C. P., Associate Attending Physician, Division of Internal Medicine, Harper Hospital, Detroit, Mich. Editorial Committee: *A. H. Aaron, Henry L. Bockus, George E. Daniels, George B. Eusterman, L. Kraeer Ferguson, A. C. Ivy, Sara M. Jordan, Frank H. Lahey, Walter L. Palmer, Harry Shay, Albert M. Snell,* and *Dwight L. Wilbur.* 790 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $15.

This book, sponsored by the American Gastroenterological Association, is a truly exhaustive treatise on an important medical subject. Its roster of more than 75 contributors is filled with internationally known figures in the field of gastroenterology. The book brings together much more information on peptic ulcer disease than has ever before been available under one cover. As with any book which is essentially a collection of related, but separate monographs, the style and readability vary, but the contributions are all of high quality. No aspect of the subject is neglected; various, and at times divergent, points of view are presented. The bibliographies, which follow almost every chapter, are extensive. This volume is a must for any collection of books on gastroenterology. It represents an authoritative and up-to-date source of reference for those who are interested in any aspect of peptic ulcer.

—*Commander H. E. Reitz, MC, U. S. N.*

Relation of Psychological Tests to Psychiatry. The Proceedings of the Fortieth Annual Meeting of the American Psychopathological Association, Held in New York City, June 1950. Edited by *Paul H. Hoch,* M. D., New York State Psychiatric Institute, College of Physicians and Surgeons, Columbia University, New York City, and *Joseph Zubin,* Ph. D., New York State Psychiatric Institute, Department of Psychology, Columbia University, New York City. 301 pages. Grune & Stratton, New York, N. Y., publisher, 1952. Price $5.50.

A book of this nature is long overdue and this one helps to fill the gap that exists between the relation of psychologic tests to psychiatry. This book presents in an honest fashion the diversity of views between psychologists and psychiatrists regarding the value, aims, validity, and limitations of the various psychologic tests. It has been written with an appreciation of the historical aspects of the subject and helps to lay the foundation for closer cooperation between the sister sciences of psychology and psychiatry. It is especially recommended for all military psychiatrists where psychologists and psychiatrists cooperate more closely than in most civilian institutions.

—*Commander L. S. Madlem, Jr., MC, U. S. N.*

Thoracostomy Versus Thoracentesis

For the Initial Drainage of Traumatic Hemothorax and Hemopneumothorax (1)

Robert B. Brown, *Captain, MC, U. S. N.*

Stanley A. Boyd, *Lieutenant, junior grade, MC, U. S. N. R.*

EXPERIENCE gained in World War II indicated that the local treatment of traumatic hemothorax and hemopneumothorax should be directed toward prompt and complete evacuation of blood and air from the involved pleural space. Such treatment favors re-expansion of the underlying lung and minimizes the complications of clotted hemothorax, empyema, or fibrothorax with the need for further operative treatment if serious loss of pulmonary function is to be prevented. Whether the early evacuation of a hemothorax might be accomplished better by thoracostomy (operative tube drainage) than by repeated thoracenteses became a most controversial question during the early phases of the Korean conflict and both methods of drainage were practiced in forward medical activities.

The present study attempts to answer the above question. We have divided our patients with hemothorax and hemopneumothorax on the basis of the type of initial drainage instituted and have compared the results obtained in each group. So far as possible these patients were kept aboard the hospital ship until evacuation of fluid and air with maintained re-expansion of the lung had been accomplished. Occasionally the number of new casualties necessitated the transfer of patients before these objectives could be attained, but in these latter cases it was usually possible by the time of transfer to prognosticate in respect to the subsequent course and the need for further operative treatment.

During the 10-month period from 20 September 1950 to 4 August 1951 there were 8,800 admissions to the hospital. One hundred and seventeen of these patients had traumatic hemothoraxes or hemopneumothoraxes;

(1) From the U. S. Naval Hospital Ship *Repose*.

22 of this latter group required no drainage. This implies that the intrapleural collection was not large and that it was resorbing satisfactorily during the period of observation. At the time of transfer from the ship all of these patients were afebrile and the chest wound was no longer a problem.

TABLE 1. *Comparison of tube drainage and thoracentesis in 95 patients*

Initial treatment	Number of patients	Subsequent thoracotomy required		Decortication performed or recommended	
		Number	Percent	Number	Percent
Tube drainage	30	7	23	5	17
Thoracentesis	65	15	23	10	15

The remaining 95 patients with hemothorax or hemopneumothorax are the primary concern of this study. In table 1 these patients are divided into 2 groups on the basis of the method used to obtain early evacuation of the intrapleural collection. The thoracostomy tubes used were water-sealed and, in a few instances, suction was established. The drainage tubes remained in place an average of 4 days, many having been removed before the patients were admitted. Fourteen of the patients in the group treated by thoracostomy required no further drainage following removal of the tubes. In 9 patients one or more subsequent thoracenteses were necessary to complete satisfactory evacuation of the hemothorax. In each of the remaining 7 patients either a second thoracotomy was performed or the procedure was recommended prior to transfer. Pulmonary decortication was the objective in 5 of these.

Sixty-five patients were treated primarily by thoracentesis, repeated as indicated. In 50 of these satisfactory drainage of the intrapleural collection was obtained by this method alone; in 15 thoracotomy was deemed necessary to complete the treatment. Pulmonary decortication was the primary object of the operative procedure in 9 and in 1 the decortication was combined with the resection of an irreparably damaged right lower pulmonary lobe.

It had been our clinical impression prior to making this study that, in those patients treated primarily by thoracostomy, residual hemothoraxes were more difficult to evacuate than the intrapleural collections treated by thoracentesis from the start. That this was the case is attested to by the fact that 44 percent (7 of 16) of such patients with significant postoperative residual collections required further operation as compared with 23 percent of the thoracentesis group.

Although the clinical impression was correct the comparison is not a fair one. When we include those patients (from the group treated

by early operative drainage) who did not require any further treatment following removal of the tubes, we find that, here too, only 23 percent (7 of 30) required a second operation.

DISCUSSION

Data are not available to determine exactly how many of the intrapleural collections in each of these 2 groups were complicated by large retained foreign bodies, extensive damage to the underlying lung or the overlying chest wall, persistent bronchial fistulas, et cetera—all factors which would impede the success of any type of simple drainage. It is our impression that these complications were fairly evenly distributed between the 2 groups and that we are dealing with true, if not large, random samples. The presence or absence of these complications seldom, if ever, was a determinant in the selection of the method of initial drainage which depended on the preference of the medical officer or medical activity concerned.

There is no evidence from this study that operative tube drainage is better than thoracentesis for the early evacuation of traumatic hemothorax or hemopneumothorax. If the establishment of tube drainage were accompanied by formal thoracotomy for exploration, evacuation of blood clots, removal of foreign bodies, closure of bronchial fistulas, and re-expansion of the lung the results should be improved from the standpoint of morbidity, but most patients with hemothoraxes do not require such heroic treatment for cure. In addition the mortality following such a procedure probably would be prohibitive in patients whose chest wounds are often only one component of multiple serious wounds. We had elected from the outset to practice the simpler procedure of thoracentesis for the initial drainage of hemothoraxes. On the other hand, as soon as it became apparent that satisfactory progress was not being made in the evacuation of the intrapleural collection because of clotting, infection, bronchopleural fistulas, et cetera, thoracotomy was performed if the patient's general condition would permit it.

In those patients on whom pulmonary decortication was performed by us the pulmonary collapse was associated with clotted hemothorax in 4, frank empyema in 3, bronchopleural fistulas in 3, and pleuritis caused by bile in 1. Retained foreign bodies were removed in several instances. The average time from injury to operation was 20 days (range 7 to 30). Some difficulty was encountered in removing the extremely friable, nonorganized peel of the patient operated on after only 7 days but in the others the procedure was technically easy and resulted in satisfactory and immediate re-expansion of the lobes involved. Streptokinase and streptodornase were not available to us during the period covered by this study.

SUMMARY

A study has been made to determine whether prompt evacuation of a traumatic hemothorax can be accomplished better by operative tube drainage than by thoracentesis. There is no evidence that thoracostomy is any more effective than thoracentesis in achieving satisfactory evacuation of the intrapleural collection. About 75 percent of the patients treated by each method recovered without further operation.

BOOK REVIEW

Annual Review of Microbiology, Volume 5. *Charles E. Clifton,* Editor, Stanford University, *Sidney Raffel,* Associate Editor, Stanford University, *H. Albert Barker,* Associate Editor, University of California. 379 pages. Annual Reviews, Inc., Stanford, Calif., publisher. 1951. Price $6.

These reviews are intended primarily for specialists in various fields of microbiology. The authors, chosen from various institutions in the United States and England, freely interpret recent findings, discard theories they believe to be fallacious, and point out new avenues of approach to the many problems still to be solved in each field. In some cases the reader may not agree with the conclusions of the reviewers, but the stimulation of the rebuttals so evoked should do much to help clarify some of the debatable issues. About one-third of the reviews in this volume are concerned with the latest findings in the fields of the morphology, cytology, enzymatic adaptation, metabolism, and nutrition of bacteria and fungi. Another one-third of them are devoted to viral studies including the physical and chemical characteristics of viruses, viral-induced tumors of man and animals, the interference phenomenon in animal and plant viruses, and the poliomyelitis and poliomyelitis-like viruses of man and animals. Miscellaneous reviews on the nutrition and metabolism of protozoa, the physiology of algae, bacterial endotoxins, the antibiotics, plant chemotherapy, pathologic plant growths, and the microbiologic deterioration of manufactured materials complete this volume. The reader can anticipate the contents of volume 6, to be published in 1952, because both the titles and authors of the reviews are included in the preface of volume 5.

—*Maj. A. Leibovitz, MSC, U. S. A.*

Finger Tip Repair

Felix P. Ballenger, *Commander, MC, U. S. N.*

TWO mistakes are frequently made in treating traumatic finger tip amputations: (1) improperly or inadequately covering the stump defect and (2) unnecessarily sacrificing the length of the stump. The loss of a finger tip or distal segment of a distal phalanx can result in a painful stump if not properly treated. Any loss of length of a digit is to be scrupulously avoided in all cases, and particularly in any patient whose occupation requires manual dexterity.

In any finger injury involving loss of length, care must be exercised to insure that as a final result the stump is adequately covered with a full thickness of healthy, tough skin and that minimal scarring is present over the volar surface of the stump. This article deals with injuries involving loss of the tip of the finger, whether it be loss of only the skin and volar pad or of a fragment of the distal bony phalanx as well. Five basic technics are available to the surgeon for repair of these defects.

1. *Granulation.* Leaving the wound open to granulate and heal by cicatrization with eventual epithelization. This treatment should never be used because it leaves a thin, unhealthy, painful scar which is likely to ulcerate with slight trauma. In addition, these scars are always hypersensitive and thus disabling.

2. *Adjacent tissue skin flaps.* Attempting to close the wound by fashioning skin flaps from adjacent tissue. In rare instances this can be accomplished without further amputation of bone. Even in those cases where closure is technically feasible, a linear vertical scar is left on the volar surface of the tip which will be hypersensitive and painful.

3. *Free skin graft.* If a split-thickness or Thiersch graft is used, the covering will be too thin. Free, full-thickness skin grafts may be used, but too frequently this type of graft will fail to take, thus leaving an ulcerated wound to treat by a second operation.

4. *Immediate one-stage pedicle graft from a distant site.* If the pedicle is made on the abdomen or other part of the body an adequate covering for the finger will result, but this entails securing the hand to the body for from 2 to 4 weeks.

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5. *Immediate pedicle graft from the palm of the hand.* A pedicle graft may be fashioned in the palm of the involved hand and immediately sutured to cover the tip of the involved finger. This method eliminates most of the defects or imperfections of the other technics.

TECHNIC

The site for placement of the pedicle is easily selected by flexing the involved digit to the palm in a comfortable position (fig. 1). A full-thickness, U-shaped pedicle is then dissected, insuring adequate length and width for the flap, and, as in all pedicle flaps, being certain to leave the subcutaneous fat attached to the prospective graft. The palmar defect may then be closed by undermining and direct suturing of the skin edges, but preferably by cutting a Thiersch graft to cover the defect and suturing it in place. The flap is then sutured to the stump of the finger tip, being careful to cover the defect completely. As frequently happens in these injuries, all or part of the fingernail may have been lost. This poses little problem, however, as the tip of the flap may be made to cover all of the defect by accurate positioning and suturing.

When the graft has been sutured in place, the suture lines are carefully covered with petrolatum gauze and the entire hand and all fingers are padded, dressed, and wrapped in gauze with all fingers flexed. From 5 to 7 days later this dressing is changed. Depending on the appearance of the wounds at this time, the sutures may be removed, or left in place if it is thought necessary (fig. 2). Usually the graft may be detached from the palm at the end of the third week, but the time for this maneuver must be determined by the appearance of the flap in each case. At the time of detachment the pedicle is severed at its base, the palmar defect sutured, the flap trimmed to fit the remaining finger area, and the graft meticulously sutured in place. After another week these sutures may be removed and a few days later all dressings may be dispensed with (fig. 3).

The patient should be warned to avoid trauma to the finger for 2 or 3 weeks after the final sutures are removed. Most patients, however, can be returned to full manual activity within 3 or 4 weeks after removing the sutures. The important feature to bear in mind is that we are seeking a volar skin covering. Scarring on the dorsum of the finger is not disabling because normal digital function does not entail trauma to this portion of the finger. Normal touch sensitivity may be somewhat diminished over the grafted area permanently, but most patients are able to carry on normal activity with no disability, even to the point of handling fine tools and small objects. More important to most patients, the finger is not painful and a healthy skin covering which can stand severe trauma is the end result.

Figure 1. Sites for making pedicle flaps in the palm to cover finger tip defects following amputation. Figure 2. Pedicle flap in palm attached to tip of third finger. This flap has been in place for 7 days and the sutures have been removed. (A) Palmar view. (B) Lateral view.

Figure 3. Same hand as shown in figure 2. This photograph was taken 7 days after the flap was detached.

CONCLUSIONS

The immediate one-stage pedicle skin graft is the method of choice for covering defects on finger tips following amputation. Fashioning this pedicle in the palm of the involved hand is superior to obtaining the skin from a distant site.

BOOK REVIEW

The 1951 Year Book of Drug Therapy (September 1950-August 1951), edited by *Harry Beckman,* M. D., Director, Departments of Pharmacology, Marquette University Schools of Medicine and Dentistry; Consulting Physician, Milwaukee County General and Columbia Hospitals, Milwaukee, Wis. 502 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1951. Price $5.

The editor, widely known for many years as a leader in the field of therapeutics, has selected the outstanding articles on drug therapy from numerous medical journals for abstracting in this year book. The material is presented in a concise, clear, and forceful manner. Publication data after each article provide a handy reference if a more complete perusal of the material is desired. The pertinent comments following many of the abstracts are timely and aid in clarifying some of the controversial points.—*Commander M. M. Driskell, MC, U. S. N.*

Caustics and Acute Necrotizing Periodontal Disease

Hubert W. Merchant, *Major, DC, U. S. A.* (1)

THE use of chromic acid and other caustics is to be condemned in the treatment of acute necrotizing periodontal disease, more commonly known as Vincent's infection. The primary object of treatment of any disease should be to return the affected tissues to as nearly normal condition and function as possible. Any substances which might further destroy an already ulcerated tissue surface should be regarded with suspicion. It would seem logical to assume that any agent which is capable of cauterizing normal tissue would cause even more destruction to a tissue already ulcerating and denuded of its protective epithelium. The results of treatment with caustics should warn us of their possible ill effects.

Studies on normal gingivas by Glickman and Johannessen (2), using one application of 6 percent chromic acid, showed erythema and edema followed by marked necrosis in 2 hours. No mechanical trauma was induced and no attempt was made to prevent dilution of the acid by the saliva and on healing a marked reduction in height of the gingival crest was noted. One should certainly be familiar with this study before using repeated applications of chromic acid and other caustics in the treatment of necrotizing periodontal disease.

Wihr (3), in a comparison of various methods of treatment in 508 patients, showed 410 "cures" (by culture methods); 98 patients failed to return for completion of the course of treatment. In this study, maintenance of oral hygiene solely by mechanical cleansing (scaling and tap water rinses) without the use of medicaments effected "cures"

(1) Dental Section, Camp Gordon, Ga.

(2) Glickman, I., and Johannessen, L. B.: Effect of 6 percent solution of chromic acid on gingiva of albino rat; correlated gross, biomicroscopic, and histologic study. J. Am. Dent. A. 41: 674-684, Dec. 1950.

(3) Wihr, N. L.: Comparison of methods of treating Vincent's infection. J. Am. Dent. A. 33: 721-725, June 1946.

as quickly as any of the other methods of treatment, including (1) Berwick's dye, (2) Churchill's iodine and 10 percent silver nitrate, (3) 7 percent chromic acid, (4) 7 percent chromic acid and scaling, (5) scaling and hydrogen perioxide, (6) 10 percent neoarsphenamine, and (7) 10 percent mercurochrome.

The determination of these cures was based not on tissue conformation and normal function, but on bacteriologic findings. Lyons *(4)* proposed a determination of cure on an appraisal of deformities in the periodontium at the end of treatment and comparison with those that prevailed at the time treatment was started. Even this has limited applicability. The determination of cure should be based on an appraisal of deformities in the periodontium at the end of treatment and comparison with the normal or with that which existed prior to the onset of the disease whether it be acute or chronic. No patient with necrotizing periodontal disease can be considered cured until the gingival tissues have been returned to as normal a contour as is medically and surgically possible although it may be impossible to return them to normal height.

The disease may pass through the acute stage into a chronic stage which is impossible to distinguish from a "cure" achieved by the use of caustics. This chronic stage may even be induced in some instances by the damage done in treatment of acute conditions with these selfsame caustics. It is extremely difficult to justify the use of drugs which produce the deformity, albeit faster, which is characteristic of the disease itself.

To achieve a true cure of the disease in the acute stage it is necessary to debride all zones of infection gently, thoroughly, and immediately. Excellent oral hygiene must be instituted and maintained and measures to correct all contributing factors must be instituted at an early date. Adjunctive noncaustic medicaments such as buffered hydrogen peroxide or normal saline solution may be used to maintain a high state of cleanliness; antibiotics may be used if indicated although their indiscriminate use is to be condemned.

Acute exacerbations of chronic cases must be treated similarly but present an additional problem after subsidence of the acute phase in that the "cupping" of the interdental papillas must be corrected before the disease can be considered cured.

CONCLUSIONS

The use of caustics in the treatment of acute necrotizing periodontal disease is to be condemned because it results in deformity undistinguishable from that produced by the disease itself.

Cures are not achieved unless and until the gingival tissues return to normal or as nearly normal conformation and function as it is medically and surgically possible to attain.

(4) Lyons, H.: Acute necrotizing periodontal disease; appraisal of therapy and critical criterion. J. Am. Dent. A. 37: 271-278, Sept. 1948.

Immediate and thorough debridement followed by a strict regimen of oral hygiene is the treatment of choice in acute necrotizing periodontal disease.

BOOK REVIEWS

Curare and Anti-Curare Agents, A series of papers originally published in Annals of the New York Academy of Sciences, Volume 54, Art. 3, pages 297-530, by *K. R. Unna* (Conference Chairman), *J. F. Artusio, A. L. Bennett, B. Berman, D. Bovet, J. C. Castillo, A. D. Console, M. A. Crews, E. J. De Beer, J. D. Dutcher, C. Eyzaguirre, R. V. Fanelli, F. F. Foldes, E. D. Goldsmith, H. R. Griffith, C. Hamilton, J. O. Hoppe, L. W. Jarcho, J. L. Lilienthal, Jr., A. R. McIntyre, B. E. Marbury, D. F. Marsh, S. Norton, W. D. M. Paton, E. W. Pelikan, A. P. Phillips, L. O. Randall, W. F. Riker, Jr., E. H. Sevringhaus, W. C. Wescoe,* and *A. L. Wnuck.* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan;* Consulting Editor, *J. A. Aeschlimann.* Illustrated. New York Academy of Sciences, New York, N. Y., publisher, October 30, 1951. Price $4.

This publication presents a group of papers prepared for the Conference on Curare and Anti-Curare Agents held by the Section of Biology of the New York Academy of Sciences in June 1951 with a report on the discussion of each and extensive bibliographies.

The subjects discussed include: Recent Advances in the Pharmacology of Curare by A. R. McIntyre et al.; Pharmacology of Calabash Curare by David Fielding Marsh; Isolation and Identification of Active Alkaloids in Extracts of Chondodendron Tomentosum by J. D. Dutcher; Curarization of Denervated Muscle by L. W. Jarcho et al.; Pharmacology of Decamethonium by W. D. M. Paton; Synthetic Drugs Influencing Neuromuscular Activity by E. J. De Beer et al.; Pharmacology of Flaxedil with Observations on Certain Analogs by W. F. Riker, Jr., and W. C. Wescoe; New Series of Synthetic Curare-Like Compounds by J. O. Hoppe; Some Aspects of the Relationship between Chemical Constitution and Curare-Like Activity by D. Bovet; Pharmacology of Anti-Curare Agents by W. C. Wescoe and W. F. Riker, Jr.; Synthetic Curare-Like Agents and Their Antagonists by L. O. Randall; Evaluation of Curarizing Drugs in Man by K. R. Unna and E. W. Pelikan; Evolution of the Use of Curare in Anesthesiology by H. R. Griffith; The Clinical Use of d-Tubocurarine by A. D. Console; Use of Mytolon Chloride in Anesthesiology by F. F. Foldes; and Quantitative Study of d-Tubocurarine, Tri-(Diethylaminoethoxy)-1, 2, 3-Benzene (Flaxedil), and a Series of Tri-Methyl- and Dimethylammonium Compounds in Anesthetized Man by J. F. Artusio et al.

Curare, first discovered as a poison used by primitive South Americans, has long fascinated the pharmacologist, but only recently has

it been reduced to a state of purity which permits its action to be predicted and controlled. There has been a great deal of research on curare, curare-like compounds, and their antagonists. This monograph is probably the most complete collection of data available in this field, giving a comprehensive review of the work that has been done on various aspects of the subject and suggesting many interesting and important avenues of investigation.

—*Commander R. L. Taylor, MSC, U. S. N.*

The United States Public Health Service, 1798-1950, by *Ralph Chester Williams,* M. D., Assistant Surgeon General United States Public Health Service, Washington, D. C. 890 pages; illustrated. Commissioned Officers Association of the United States Public Health Service, Bethesda, Md., publisher, 1951. Price $7.50.

Dr. Williams, career officer of the USPHS from 1917 to 1951 has written an extraordinarily interesting history of the USPHS from its humble origin in 1798 to its present influential position in American medicine. His attractively constructed book is large and must be regarded as a reference work rather than a popular story of the rise and growth of an important American institution. Most medical officers of the Armed Forces know that the USPHS is the principal agency of the Federal Government concerned with the National health program and their views and opinions of this agency may be tempered by their private opinions as to the role of the Government in medicine and public health. Probably few, however, have been in a position to evaluate fairly the great influence of the USPHS on American medicine or on the practice of medicine in the Armed Forces. In 2 great wars and in the periods between those wars the USPHS has been a tower of strength to the Armed Forces of the United States, whose problems since 1900 have been largely in the field of preventive medicine. The USPHS has pioneered much of our knowledge in this field. Malaria, yellow fever, plague, typhus, nutritional diseases, and the childhood exanthems were formerly of primary concern to the Army. The pioneer laboratory, epidemiologic, and field investigations of these problems by the USPHS have been used extensively by the other uniformed medical services for the protection of the Armed Forces in combat and in peace. Dr. William's well-documented story of a sister service should be consulted by every medical officer who desires background material on the health problems, solved or unsolved, of the Armed Forces. It is an inspiring and heartening experience in these times to peruse a book such as this. No bombast, self-glorification or "Federal agency justification" is found here, but, rather, the quiet pride of a fine organization in a job well done.—*Col. K. R. Lundeberg, MC, U. S. A.*

Bilateral, Symmetrical Syndactylism

George Alvary, *Major, U. S. A. F. (MC)* (1)

SYNDACTYLISM is the most common congenital deformity of the hand and occurs once in every 1,000 to 3,000 births (2). Barsky (3), believes that it is impossible to find a practical clinical classification of hand anomalies and stated: "Many congenital anomalies of the hand are not simple defects but are complicated, combining a number of related or unrelated malformations." The case reported here is of special interest because bilateral, symmetrical webbing of the ring and little fingers occurred as a constant defect of the hand in 11 members of 1 family. The defect was distributed through 5 generations. The patient was a 19-year-old man who was proud to come from a family of "Kentucky hillbillies." The family was conscious of their webbed fingers and the patient and his mother had traced all members of the family personally. Of the 46 members of the family shown in figure 1, 11 were afflicted with syndactylism; of these, 7 were male, 3 were female, and 1 was of unknown sex.

Although the cause of congenital anomalies of the hand is not definitely known, several theories have been advanced. Experimental and genealogic surveys lead to the conclusion that genetic factors are the principle cause (3). Imperfect development can be caused by many factors affecting the genes, including defects of the germ plasm. These may be transient or permanent. Radiation, nutritional and toxic influences, and severe infectious diseases will cause a temporary defectiveness of the germ plasm. Most anomalies of the hand are inherited; yet no general statement can be made as to whether these defects are Mendelian dominants that sometimes may or may not skip one generation, or change their form of expression or otherwise "behave in an atypical manner" (3).

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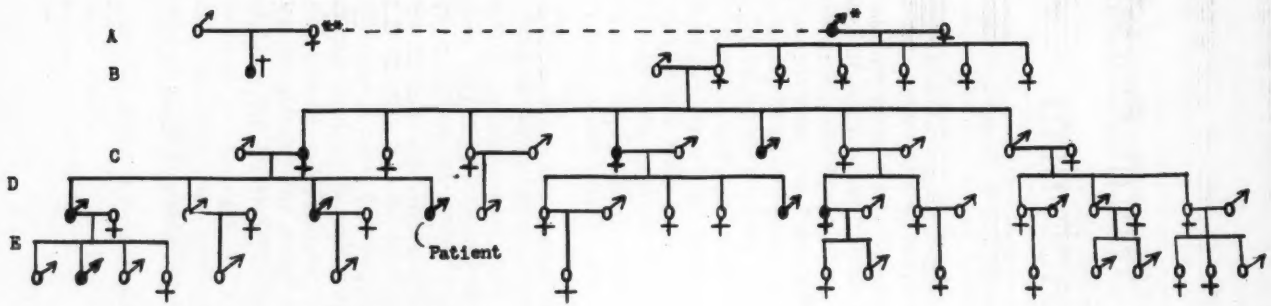
(1) Westover Air Force Base, Mass.

(2) Bunnell, S.: Surgery of the Hand. 2d edition. J. B. Lippincott Co., Philadelphia, Pa., 1948.

(3) Barsky, A. J.: Congenital anomalies of hand. J. Bone & Joint Surg. 33-A: 35-64, Jan. 1951.



* Patient's great-grandfather came from England with his sister (**).
† Had syndactylism but sex not known- died 48 hours after birth of unknown causes.
● Afflicted with bilateral syndactylism.
0 Normal.
Patient's grandfather had 6 girls (row B) of whom only 1 married and produced 7 children, 3 with syndactylism (row C). Among these was the patient's mother who gave birth to 4 boys of whom 3 had syndactylism.

Figure 1. The hereditary influence in syndactylism.

Figure 2. Preoperative appearance of the hands. The deep furrow over the right ring finger was caused by the "double jointed" proximal interphalangeal joint in hyperextension.

To explain these failures of expected ratios, the geneticists use many explanatory and qualifying terms; such as, "variable expression," "variation of penetrance," "inhibiting or modifying genes," "environmental factors," or "incomplete dominance" *(3)*. In this particular family, syndactylism has not been associated with other gross defects or congenital anomalies. The patient, however, did show flail joints, shortened phalanges, and fusion of the distal phalanges on the left side (figs. 2 and 3).

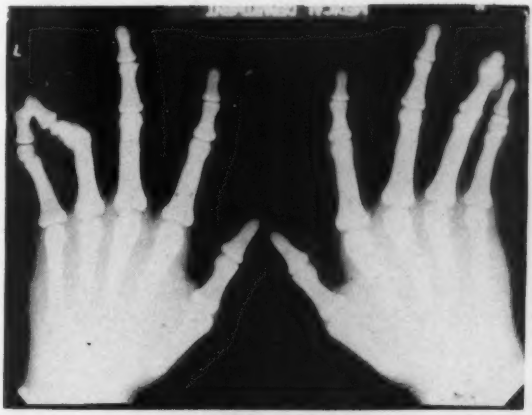


Figure 3. Roentgenogram of hands showing synostosis of the terminal phalanges on the left side. Both middle phalanges on the left, one on the right, and one terminal phalanx on the right side are shortened. Significant arthritic changes are present only in the proximal interphalangeal joint of the left little finger.

Figure 4. Extension of the fingers 2 months after separation of syndactylism. Full extension of the proximal interphalangeal joint of the left ring finger is limited by 30° with some external rotation at the metacarpophalangeal joints. These residuals might have been prevented by correction in childhood.

Repair of syndactylism can be accomplished by a flap operation, a free skin graft, or a combination of the 2 methods. This is best done at an early age, preferably from 3 to 7 years of age, before distortion or contracture of the joints develop. In this patient the defect was repaired by a small, V-shaped flap from the dorsum of the finger, pedicle proximal, which was reflected across the base of the web space after the fingers were separated. The remaining denuded areas were covered with a free, thick, split-thickness graft. On the right side, this procedure was

Figure 5. Fingers in full flexion.

relatively easy. On the left side, 2 operations were required to release scar contractures that had developed over the palmar aspect of the ring finger. This method of repair produced a satisfactory functional and cosmetic result (figs. 4 and 5).

BOOK REVIEWS

The Influence of Hormones on Enzymes, a series of papers originally published in Annals of The New York Academy of Sciences, Volume 54, Art. 4, pages 531-728, by *R. I. Dorfman* and *E. D. Goldsmith* (Conference Chairmen), *R. C. Bentinck, S. L. Cohen, D. R. Drury, E. Eisenberg, G. Feldott, W. H. Fishman, G. S. Gordan, J. L. Gray, M. Hayano, R. M. Hochster, H. Jensen, C. D. Kochakian, M. E. Krahl, H. A. Lardy, E. M. MacKay, J. H. Quastel, W. C. Stadie, E. W. Sutherland, H. M. Tepperman, J. Tepperman, W. W. Umbreit, F. Verzar,* and *A. N. Wick.* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan.* Illustrated. The New York Academy of Sciences, New York, N. Y., publisher, 1951. Price $3.50.

This monograph is a result of a conference on the influence of hormones on enzymes held by the Section of Biology of the New York Academy of Sciences in June 1951. It is made up of 15 papers which bring together in one volume representative data and critical opinions of 24 outstanding authorities on the subject. Many of the papers serve as basic communications on the influences of pituitary and adrenal hormones on various enzyme systems, thus suggesting some of the mechanisms by which these agents have such widespread and potent influences on many physiologic processes. Other studies relate to the actions of thyroxin, insulin, and testosterone on metabolic activities at various sites. This is a valuable addition to the literature on endocrine function and should be of great value to those interested in research or studies in the basic sciences. Because of the nature of the subjects, the monograph does not include material at a clinical level and, therefore, will have little appeal to the physician whose main interest is patient care.—*Maj. J. L. Sherman, Jr., MC, U. S. A.*

The Genetics of Micro-organisms, by *D. G. Catcheside,* Reader in Plant Cytogenetics, University of Cambridge; Fellow of Trinity College, Cambridge. 223 pages; illustrated. Pitman Publishing Corp., New York, N. Y., 1951. Price $4.50.

This textbook clearly presents the fundamentals of the known inheritance mechanisms in organisms which can propagate vegetatively from single cells. It is based on a course of lectures given to biochemists specializing in microbiology and provides a brief but adequate summary of present knowledge in the field, serving also as an excellent guide for research which eventually will reveal the nature and mode of action of genes. Four chapters are devoted to genetic analysis in *Neurospora* and other fungi, mutation and gene action, adaptation and

mutation, and sexual reproductive systems. Separate chapters deal with inheritance in yeasts, protozoa, bacteria, and viruses. An extensive bibliography is included.—*Lt. Col. L. R. Kuhn, MSC, U. S. A.*

A Dictionary of Antibiosis, compiled by *Leonard Karel,* National Institutes of Health, United States Public Health Service, Federal Security Agency, and *Elizabeth Spencer Roach.* 373 pages. Columbia University Press, New York, N. Y., publisher, 1951. Price $8.50.

This is an exhaustive, alphabetically arranged compilation of substances, both lower and higher forms, from which antibiotics ("substances derivable from living forms and capable of adversely modifying the vital functions of specific micro-organisms") have been derived, showing the micro-organisms against which they have been tested. Available information on the source of each substance, its extraction, its chemical and physical properties, its spectrum in vivo and in vitro, its structural formulas, and the toxicologic, pharmacologic, and clinical results following its use is listed. A bibliography with appropriate cross references is included. This comprehensive and authoritative volume should be of value to research workers in the broad field of antibiotics.—*Lt. Col. E. J. Pulaski, MC, U. S. A.*

Roentgen Examinations in Acute Abdominal Diseases, by *J. Frimann-Dahl,* M. D., Ph. D., Chief of Roentgen Department, Ulleval Hospital, Oslo, Norway. 323 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $10.50.

In this attractive and compact book the author presents valuable roentgenographic data concerning the peritoneal cavity and adjacent structures. The book contains a wealth of reproductions of excellent roentgenograms. Schematic drawings of normal and pathologic findings help in the interpretation of the roentgenograms which are printed in the "negative." The opening chapter deals with roentgenographic technic and preparation of the patient and apparatus. The second chapter lays the groundwork for the pathologic changes discussed in the succeeding chapters and analyzes the roentgenographic appearance of normal structures. The remainder of the book covers all the acute abdominal conditions and their effects on adjacent organs. Outstanding discussions include such topics as production and absorption of gas and fluid in the peritoneal cavity and gastrointestinal tract, meteorism, mechanical obstruction, functional ileus, intussusception, volvulus, and abdominal trauma. The differential diagnosis of abdominal disorders from pulmonary, gynecologic, and urinary conditions is discussed in individual sections.

—*Lt. Col. J. Gonzalez-Rodriguez, MC, U. S. A.*

Pilonidal Cyst

Follow-up Studies on 481 Patients (1)

Allen Kleiman, M. D. (2)

THIS is a report of the follow-up studies on 481 patients with pilonidal cyst treated at this hospital. These patients have been followed for a minimum of 10 months and a maximum of 44 months. A previous report (3) dealt with the immediate postoperative results on 584 patients on whom various technics of open packing or primary closure were used. The experience reported therein revealed a 90 percent primary healing rate for patients treated with a steel wire technic of primary closure. The technic was described. The local use of chemotherapeutic agents or the systemic use of penicillin was found to improve the percentage of primary healing. It was not found necessary to induce constipation or to limit the patients' diet in any way. All patients were put on a regular diet on the first postoperative day. This method of treatment was found preferable to other methods of primary closure and to excision and open packing. The follow-up results reported herein tend to confirm these findings.

SELECTION OF CASES

All patients whose pilonidal cysts were excised at this hospital, who were observed for 10 months or longer, were included in this study. Those in whom a recurrence was noted prior to 10 months were also included. The patients were grouped according to the length of the follow-up. Most of them were included in the previous report.

FOLLOW-UP TECHNIC

The follow-up observations were by personal visit, whenever possible. Some of the patients, however, lived at great distances and could not afford either the time or the expense involved in repeated follow-up visits. Such patients were requested to fill in a questionnaire regarding the state of wound healing, the presence or absence of symptoms, and the recurrence of drainage, et cetera.

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(1) From Halloran Veterans Administration Hospital, Staten Island, N. Y.

(2) Present address: 1545 West Keim Drive, Phoenix, Ariz.

(3) Kleiman, A.: Pilonidal cyst; Comparison of surgical treatments. Surgery 28: 851-856, Nov. 1950.

RESULTS

Table 1 includes *all* the patients operated on and reveals a recurrence rate of 16.2 percent for the entire group. Table 2 shows the results of open packing and of primary closure and, for comparison, the results of the steel wire closure which has become the operation of choice in this hospital in the past several years. The wire closure shows a statistically significant advantage over open packing. Table 3 shows the results of the various methods of primary closure. There again, the wire technic shows superior results over the other methods of primary closure. Table 4 compares the results of secondary closure and of partial closure.

DISCUSSION

We believe with most other authors that recurrence of the pilonidal cyst is usually due to failure to obliterate dead space, the so-called "false recurrence," rather than to the retention of bits of the sinus tract lining. This point is highlighted but not statistically established by the 50 percent recurrence rate in the patients whose wounds were closed primarily without retention sutures or other means of obliterating the dead space.

Under the term "recurrence," I have included all patients with recurrent sinus formation, purulent drainage, et cetera *plus* all those whose wounds did not heal and remain healed after 15 months. Thus several of the wounds treated by "open packing" healed with irregular, soft, friable scars which continued to break down superficially without true sinus formation, or continued to form skin bridges which had to be broken down. Patients whose wounds behaved in this fashion up to 15 months were listed as having a poor result; after this time they were listed as having a recurrence.

Various technics of primary closure are reported. The steel wire closure shows a lower recurrence rate than any of the others (table 3). This fact, coupled with the better immediate postoperative results of the wire technic *(3)* has caused us to abandon all the other methods of closure. The small number of patients with secondary or partial closure is too small to permit any statistical interpretation. We believe, however, that the indications for such procedures are extremely limited.

The immediate results of primary closure with wire and antibiotics applied locally or given systemically are better than can be obtained with any other technic we have attempted. The follow-up results here described are also better with this type of closure than were obtained with any of the others. We believe, therefore, that any pilonidal cyst which *can be* treated with primary closure *should be* treated in that fashion. The only limitations to primary closure are (1) size (too large or too irregular a wound to allow apposition of the skin edges) and (2) position (extending down to within 1 cm. of the anus). The degree of infection, excepting only the presence of an acute abscess, does not effect the decision with regard to the feasibility of closure.

TABLE 1. *Comparison of results in new and recurrent cases*

Type of case	Number of cases	Recurrences		Results	Recurred before 10 months	Follow-up period (months)				
		Number	Percent			10-14	15-23	24-29	30-36	Over 36
New	408	62	15.2	Good		353	238	105	52	24
				Poor		8				
				Recurrence	35	12	15			
Recurrent	73	16	22.0	Good		57	38	13	8	4
				Poor		5				
				Recurrence	10	1	4	1		
Total	481	78	16.2	Good		410	276	118	60	28
				Poor		13				
				Recurrence	45	13	19	1		

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TABLE 2. *Comparison of open packing and primary closure technics*

Technic	Number of cases	Recurrences		Results	Recurred before 10 months	Follow-up period (months)				
		Number	Percent			10-14	15-23	24-29	30-36	Over 36
Excision and open packing	114	20	17.5	Good		92	64	21	11	4
				Poor		12				
				Recurrence	8	2	9	1		
Primary closure with steel wire skin and retention sutures	219	23	10.5	Good		199	132	50	19	9
				Poor		1				
				Recurrence	12	7	4			
Primary closure: all technics	351	50	14.2	Good		310	209	97	49	24
				Poor		1				
				Recurrence	31	9	10			

TABLE 3. *Comparison of results of primary closure by various technics*

Technic	Number of cases	Recurrences		Results	Recurred before 10 months	Follow-up period (months)				
		Number	Percent			10-14	15-23	24-29	30-36	Over 36
Steel wire skin and retention suture	219	23	10.5	Good Poor Recurrence	12	199 1 7	132 4	50	19	9
Musculofascial flap	62	9	14.5	Good Poor Recurrence	6	56	44 3	30	22	11
Buried nonabsorbable sutures	24	6	25.0	Good Poor Recurrence	5	19	9 1	6	3	2
Buried absorbable sutures	26	5	19.2	Good Poor Recurrence	1	23 2	15 2	7	2	
Primary closure without retention sutures or buried sutures	8	4	50.0	Good Poor Recurrence	4	4	2			
Other technics	12	3	25.0	Good Poor Recurrence	3	9	7	4	2	1

TABLE 4. *Comparison of results of partial closure and of seconday closure*

Technic	Number of cases	Recurrences		Results	Recurred before 10 months	10-14 months	15-23 months
		Number	Percent				
Partial closure	6	5	83.3	Good Poor Recurrence	3	1 2	
Secondary closure	10	3	30.0	Good Poor Recurrence	3	7	3

SUMMARY

A follow-up study has shown that the long-term results, like the immediate postoperative results are better with a primary closure using steel wire than with any other method used. With this type of primary closure, the recurrence rate was 10.5 percent in contrast to 17.5 percent when the excision and packing method was used.

Sponsored by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect opinion or policy of the Veterans Administration.

BOOKS RECEIVED

Hippocrates on Intercourse and Pregnancy, An English Translation of on Semen and on the Development of the Child, by *Tage U. H. Ellinger,* Sc. D., M. A., with an introduction by *Alan F. Guttmacher,* M. D. 128 pages. Henry Schuman, Inc., New York, N. Y., publisher, 1952.

Early Care of the Seriously Wounded Man, by *Henry K. Beecher,* M. D., Henry I. Dorr Professor of Research in Anesthesia, Harvard University; Chief, Department of Anesthesia, the Massachusetts General Hospital, Boston, Mass.; Formerly Lieutenant Colonel, Medical Corps, Army of the United States, and Consultant in Resuscitation and Anesthesia, Mediterranean Theater of Operations; Consultant to the National Institute of Health; Consultant to the Surgeon General, United States Army. American Lecture Series Publication No. 138, A Monograph in American Lectures in Surgery. 32 pages. Charles C Thomas, Publisher, Springfield, Ill., 1952.

Transactions of the New York Academy of Sciences, December 1951. *Roy Waldo Miner,* Editor, and *James A. Goode,* Associate Editor. 123 pages. The New York Academy of Sciences, New York, N. Y., publisher, 1951. Price $ .50.

Late Complications of Genitourinary Injuries[1]

Malcolm W. Arnold, *Captain, MC, U. S. N.*

Irwin T. Rieger, *Lieutenant, MC, U. S. N. R.*

ALTHOUGH much has been written concerning emergency and early treatment of war wounds of the genitourinary organs, not many reports have been made concerning treatment of late urologic complications of these injuries. Lewis (2) has reported his experience with this type of case at Walter Reed Hospital during World War II. We wish to present two cases that resulted from the fighting in Korea in the fall of 1950.

CASE REPORTS

Case 1. A 24-year-old man was hit by enemy fire on 25 September 1950. One bullet fractured both bones of the left leg and others caused several wounds of the perineum and medial aspects of the thighs. At a field hospital the left leg was placed in a plaster cast and a suprapubic cystostomy was performed. The cast was changed several times, and the suprapubic tube was removed about 2 months after the original injury. The patient did not remember any urethral investigation or instrumentation.

He arrived at this hospital on 23 December and was admitted to an orthopedic ward. His left leg remained in a cast. There was a draining puncture wound on the inner aspect of his right thigh. His perineum was extremely scarred and in the angle between his scrotum and left thigh there was a small granulating opening. He had lost 50 pounds, was mentally depressed, and haggard in appearance. On urinating he had moderate perineal pain and urethral burning, and a small amount of purulent urine escaped from the opening to the left of the scrotum.

He was transferred to the urologic service shortly after admission. Roentgenograms revealed a bullet in the soft tissue of his right buttock, a bladder stone about 3 cm. in diameter, and a normal upper

(1) From the U. S. Naval Hospital, Great Lakes, Ill.

(2) Lewis, L. G.: Cases of severe pelvic injury. Ann. Surg. 121: 470-477, Apr. 1945.

urinary tract. Antibiotics were given and his urine was acidified. The bullet in his buttock was removed under local anesthesia in the ward surgery. The draining wound of his right thigh persisted beyond a reasonable length of time and exploration revealed a 6-inch Penrose drain in its depths. On removal of this the wound quickly closed.

Investigation of his urethra revealed a stricture in the region of the bulb barely admitting a 4 Fr. filiform sound. This was dilated slowly over a number of days until an 18 Fr. indwelling Foley catheter could be inserted and left in place. With a 16 Fr. cystoscope the presence of the bladder stone and a severe, chronic cystitis was confirmed. Slowly increasing sizes of Foley catheters were inserted over a period of 4 weeks until the stricture was dilated to 28 Fr. During that time the leg cast was removed and modified weight bearing and physiotherapy begun.

When the stricture had been adequately dilated the bladder stone was crushed and removed with a lithotrite under spinal anesthesia. Weekly urethral sounding was then carried out and about 6 weeks after the litholapaxy the urethral fistula to the left of the scrotum closed completely. The patient was discharged on 13 June 1951. He had regained the weight lost, was in excellent spirits, and was voiding normally. He was advised to have the stricture checked at frequent intervals.

Comment. Review of this case reveals that the early treatment of the urethral injury was insufficient. This was, no doubt, due to the presence of other more obvious major wounds and to the presence of the suprapubic cystostomy which permitted satisfactory urinary drainage, thus making it easy to neglect the urethral injury. Thorough investigation of the damaged urethra should have been carried out as soon as possible after the emergency treatment was completed. If surgical repair of the urethra was decided against, an indwelling catheter should have been inserted. After several days this could have been removed and frequent urethral soundings carried out. If any large injury exists, surgical repair is the treatment of choice. It is far easier to prevent extensive stricture formation than to treat it after it has occurred. Safety pins should always be used to prevent drains from slipping back under the skin as happened in this patient.

Case 2. On 4 September 1950 a 27-year-old man was hit by shell fragments which entered his left groin and genitalia. Abdominal exploration through a transverse suprapubic incision revealed no injury to his vital organs. It was necessary to remove his left testis through a scrotal incision. He was received at this hospital on 26 September. The suprapubic wound had healed, but the scrotal incision was still draining. He was treated with hot packs and antibiotics and the scrotal wound ultimately healed. Roentgenograms revealed numerous small metallic fragments scattered through the soft tissue of his scrotum, left groin, and the left penopubic angle. On 14 November several of the larger fragments were removed from his scrotum and groin.

Meanwhile, he had told us that on erection his penis pointed vertically along the abdomen and could not be deflected ventrally without severe pain. Sexual intercourse was impossible. Examination disclosed that heavy scar formation in the penopubic angle was responsible for this. There was also moderate deviation of his penis to the left in a flaccid state due to contraction of the scar in his groin. He was advised to attempt gentle stretching of this scar tissue.

When no improvement in the condition was noted after several months, a plastic procedure was performed on 4 January 1951. The dense scar tissue superior and to the left of his penis was entirely excised. A skin flap with subcutaneous fat attached was then mobilized from the abdomen and swung down to fill in the defect. The skin edges were undermined and brought together above. The wound healed well except for a small area which sloughed, necessitating a few pinch grafts above the flap and remote from the penopubic angle.

The patient was discharged on 5 April with all wounds well healed. There was no deviation of the penis in a flaccid state. On erection the penis stood straight out. According to the patient sexual intercourse was not only possible, but highly satisfactory.

Comment. The late complication in this patient was deviation of the penis caused by dense scarring and inflammatory tissue formed around numerous small metallic fragments. This would have been difficult, if not impossible, to prevent as it was impracticable to remove all these fragments individually.

BOOK REVIEWS

Thematic Test Analysis, by *Edwin S. Schneidman,* Ph. D., Clinical Psychologist, Veterans Administration Neuropsychiatric Hospital, Los Angeles, Calif.; Lecturer, University of Southern California, with the collaboration of *Walther Joel,* Ph. D., Assistant Chief Clinical Psychologist (Psychotherapy), V. A. Neuropsychiatric Hospital, Los Angeles, Calif.; Lecturer, University of Southern California; and *Kenneth B. Little,* Ph. D., Clinical Psychologist, V. A. Hospital, San Francisco, Calif.; Research Associate, University of Southern California. Foreword by *Henry A. Murray,* M. D. 320 pages; illustrated. Grune & Stratton, New York, N. Y., publishers, 1951. Price $8.75.

This book is a bold and astonishing adventure in the field of psychologic writing. Among several stated aims of the author is that of holding a "psychological autopsy" on one case in which the emphasis is on prediction of behavior. This he accomplished through the cooperation of 25 contributors, 15 of whom are thematic apperception test (TAT) methodologists, each of whom has published a method for analyzing the TAT. Each of the 15 was furnished the test protocols of the TAT and

the Make a Picture Story (MAPS) Test of "John Doe" and his age, sex, and marital status. Each was then asked to analyze the tests by his own method and to describe his technics, such as working procedures, work notes, step-by-step notations, tabulations, and final write-up.

This book supplies the complete protocols of the 2 tests and the findings of the various contributors. It also furnishes the protocol of the Rorschach test, figure drawings, and Bender-Gestalt drawings, each interpreted by an expert in the respective tests. Finally, behavioral data, therapy notes, and a psychiatric follow-up interview are included. The boldness of this experiment lies in the willingness of these experts to perform a "blind analysis," ordinarily a foolish waste of time, and to expose themselves and their methods to the merciless scrutiny of the psychologic world. The astonishing part of the experiment is that so many of the results show a surprisingly high degree of correlation with one another and with the facts of the case despite the fact that some of the contributors gave full sway to their intuitive inclinations.

The book should prove interesting and provocative to the experienced psychologist and valuable to the novice who will find in one volume a variety of technics from which to choose. The humility and honesty of approach apparent in this book will also give him courage and inspiration to embark on his own psychologic adventures.

—Lt. Col. E. King, U. S. A. F. (MSC)

Cardiac Pain, by *Seymour H. Rinzler,* M. D., F. A. C. P., Adjunct in Medicine and Cardiovascular Research Unit, Beth Israel Hospital; Instructor in Rehabilitation, New York University College of Medicine; Associate Visiting Physician, Bellevue Hospital, New York City. American Lecture Series Publication No. 113, A Monograph in American Lectures in Circulation. 139 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $3.75.

The author has done well with the difficult task of covering such a vast subject in monograph form. The bibliograpy contains references to many excellent publications. The chapter on history contains well-chosen quotations from Heberden, Herrick, and others which should be remembered by all who treat patients with this condition. Chest wall pain, thoracic pain in general, and treatment are discussed. Various views relating to angina pectoris, coronary failure, coronary insufficiency, and myocardial infarction are presented, but not in sufficient detail to convince the reader of the merits of the different concepts. It would be difficult to treat a patient if the chapter on therapy given here were the physician's sole guide.

—Col. W. S. George, MC, U. S. A.

Coarctation of the Aorta in a Child

Bruce F. Grotts, *Captain, MC, U. S. A. R. (1)*

COARCTATION of the aorta is an unusual congenital abnormality and a diagnosis is rarely made in childhood, possibly because the symptoms and signs are not well developed, and differ somewhat from those found in adults. The incidence of coarctation has been estimated by Blackford *(2)* as 1 in 1,500 from 68,300 autopsy reports. Abbott *(3)* reported only 1 case in 5,000 consecutive autopsies. In 1938, Eisenberg *(4)* reported collecting 11 cases occurring in children and added 3 more, 1 being in a child 2½ years of age. Blumenthal and Davis *(5)* presented 2 cases in children, 20 months and 12 years of age and Olney and Stephens *(6)* recorded 14 cases in children, only 7 of whom were less than 10 years of age. Reifenstein et al. *(7)* collected only 5 post-mortem specimens in children between 2 and 10 years of age out of a total of 103 autopsies performed on persons having coarctation.

It is my purpose in this article to report a case of an adult type of coarctation in a 4-year-old boy, and to review the differences in findings in children as compared to those in adults, because most reports refer only to the findings in adults. It is important to the patient to know of his condition in order that he may have the lesion repaired, or limit his activities. Often asymptomatic patients with compensated hearts suddenly decompensate, develop subacute bacterial endocarditis, or have a

(1) U. S. Army Hospital, Camp Rucker, Ala.

(2) Blackford, L.: Coarctation of aorta. Arch. Int. Med. 41: 702-735, May 1928.

(3) Abbott, M. E.: Coarctation of aorta of adult type; statistical study and historical retrospect of 200 recorded case with autopsy, of stenosis or obliteration of descending arch in subjects above age of 2 years. Am. Heart J. 3: 574-618, June 1928.

(4) Eisenberg, G.: Recognition of coarctation of aorta (adult type) during childhood. J. Pediat. 13: 303-308, Sept. 1938.

(5) Blumenthal, S., and Davis, D. B.: Coarctation of aorta in childhood; report of 2 cases in which diagnosis was confirmed by intravenous injection of diodrast. Am. J. Dis. Child. 62: 1224-1232, Dec. 1941.

(6) Olney, M. B., and Stephens, H. B.: Coarctation of aorta in children; observations in 14 cases. J. Pediat. 37: 639-648, Oct. 1950.

(7) Reifenstein, G. H.; Levine, S. A.; and Gross, R. E.: Coarctation of aorta; review of 104 autopsied cases of "adult type" 2 years of age or older. Am. Heart J. 33: 146-168, Feb. 1947.

cerebral hemorrhage or aortic rupture while engaging in physical exercise. Such occurrences were fairly common in Abbott's series of 196 cases, the catastrophe striking in the prime of life in an otherwise unsuspecting person.

CASE REPORT

A 4-year-old boy was seen in the pediatric clinic for acute tonsillitis. At that time a heart murmur was noted but the mother stated that the family physician had recognized it on several occasions and had said that it was probably functional, as it seemed to change character with the altered position of the patient. The child was seen again in the hospital 1 week after his clinic visit with a severe left lobar pneumonia, which finally cleared after aureomycin and sulfadiazine were given parenterally. During his convalescence his cardiac status was investigated.

The patient had never had any complaints referable to his heart. He had seemed to play and act normally, and had not had any dyspnea with exertion or precordial pain. His development as an infant had not been unusual and he had had many of the common childhood diseases without complications. No chronic fever had ever been recognized, and his weight gain was slow but adequate.

Physically, he was fairly well developed, but the musculature in the legs was less well developed than that in the arms. There was no clubbing of the fingers, cyanosis of the nailbeds or lips, edema, or obvious congenital abnormalities. He appeared somewhat pale but he played about the ward normally with the other convalescing children. A precordial grade 3 systolic murmur which was loudest in the second and third left interspaces close to the sternal border was heard. The murmur was transmitted to the axilla and through to the back and along the spine. The cardiac rate was regular and the heart did not appear enlarged to percussion. There was no thrill to palpation, dilation of the vessels in the neck or posterior thorax, evidence of cardiac decompensation, or palpable pulse in the femoral or dorsalis pedis arteries. No blood pressure was obtained in the legs. Blood pressure in both arms was about 138/50.

Cardiac roentgenograms revealed a slight enlargement of the left ventricle and right auricle. The aortic knob could not be seen, and no rib notching was noted. The leukocyte count on admission was 34,000 with 87 percent neutrophils. At the time of discharge the leukocyte count was 18,000 with 70 percent neutrophils. The ECG revealed a slight right axis deviation but was considered to be within normal limits.

It was believed the patient had an adult type of coarctation of the aorta, and after the study was completed he was referred to Walter Reed Army Hospital where the diagnosis was confirmed. It was decided there that definitive surgical treatment should be delayed until the patient was 8 years old provided he remained asymptomatic.

DISCUSSION

Coarctation of the aorta is 4 or 5 times more common in male than in female patients. Division into infantile and adult types is misleading, because patients with the infantile type may live to adult life, and many autopsies on infants which revealed the adult type of coarctation have been recorded (7).

The so-called infantile type of coarctation consists of a narrowing of the aorta between the origin of the left subclavian artery and the insertion of the ductus arteriosus and can be regarded as a persistence of the anatomic relations that existed before birth (3). In the adult type there is an aortic constriction adjacent to the insertion of the ductus, usually below it. Most patients with the infantile type die in the first year of life, for as long as the ductus remains open, as in fetal life, the demands of the body are satisfied, but with closure of the ductus the organism cannot withstand the change. Moreover, these patients frequently have other marked developmental cardiovascular adnormalities incompatible with life (5). Because of the location of the adult type of coarctation the heart has established a collateral circulation when the ductus closes. The great vessels of the aortic arch and the first few intercostal arteries are usually much dilated. Consequently, patients with this condition often live to adult life, the collateral circulation keeping pace with the systemic demands. Coarctation is considered to be a true abnormality of development arising in embryonic life, and because it is usually associated with vestiges of the ductus and embryonal left sixth aortic arch it would seem they are both involved in a process of delayed involution (3).

DIAGNOSIS

The presenting symptoms in children with the adult type of coarctation are variable, and many patients are asymptomatic, as was true in the patient reported. Excessive fatigue, dyspnea on exertion, precordial pain, headache, head-sweating or flushing of the face, intermittent claudication, and tingling and coldness of the legs exaggerated by fixed positions may be present.

On physical examination the muscular development of the lower legs may be reduced and a pallor inconsistent with the hematologic findings is often present (6). There may be signs of decompensation such as rales and an enlarged liver or spleen. A precordial bulge or other chest deformity, forceful suprasternal and carotid pulsations, as well as enlarged superficial vessels over the chest have been noted. The latter finding, however, is of greater significance in adults (5). Collateral circulation is rarely seen in the first decade (8,9) even though King be-

(8) Gross, R. E.: Coarctation of aorta; surgical treatment of 100 cases. Circulation 1: 41-55, Jan. 1950.

(9) Schwartz, S. P., and Greene, D.: Coarctation of aorta in children; syndrome of constriction of isthmus of aorta, with involvement of origin of left subclavian artery. Am. Heart J. 23: 99-113, Jan. 1942.

lieved that the demonstration of it was the most important single clue in adults *(10)*.

In addition to this finding, there commonly is relative weakness and delay or absence of the pulse in the lower limbs. Simultaneous palpation of both the femoral and radial pulses is necessary for this discovery. Although, when this finding is present it is pathognomonic, it is not constant. Oscillometric examination offers valuable information when the diagnosis is in doubt.

The marked difference between the systolic blood pressure in the upper and lower extremities is probably the most important single sign *(3)*. Normally, the lower leg pressure is about 20 mm. of mercury higher than that of the arms, but in coarctation the reverse is true. Up to the year 1946, this was rarely if ever reported in patients under the age of 5 years, and Gross has noted that the blood pressure in the arms of children with coarctation may be normal or only slightly elevated *(7,8)*. The 4-year-old patient herein reported did have slightly elevated pressure in the upper extremity.

The heart may or may not reveal murmurs *(8)*. There may be a basal diastolic, or a grade 2 or 3 basal systolic murmur often with transmission to the back between the scapulas and along the spine, and with an associated thrill *(7)*. Riefenstein, unlike Perlman, believed that the diastolic murmur was not found in uncomplicated coarctation, and that a systolic murmur was always present. A continuous machinery-type murmur has also been reported *(9)*. Many authors believe that the precordial murmur is of little assistance, and may be transitory or even absent *(5,8)*.

The roentgenogram, too, may be of little assistance in children, as opposed to the adult findings. Typically, beyond the first decade there may be absence of the aortic knob, prestenotic or poststenotic dilatation of the aortic arch, nonvisualization of the aorta in the left oblique view, erosion of the lower margin of the posterior portions of the ribs and roundness or enlargement of the left ventricle. A child, however, may or may not have cardiac enlargement, and many times there is little variation from the normal *(8)*. Rib notching, likewise, may often be absent and some authors even believe it to be of little help in diagnosis *(5,10)*. It has been noted, however, in patients as young as 5 years of age *(11)*.

The ECG as a diagnostic aid in children is of very little value. The readings may be normal or possibly reveal a left axis shift. The changes as observed in adults, depend on the myocardial response to long continued strain.

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(10) King, J. T., Jr.: Stenosis of isthmus (coarctation) of aorta and its diagnosis during life. Arch. Int. Med. 38: 69-95, July 1926; correction 38: 409, Sept. 1926.

(11) Nelson, W. E. (editor): Textbook of Pediatrics (Mitchell-Nelson). 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1946. p. 825.

TREATMENT

Iodopyracet given intravenously or retro-arterially may aid in visualization of the lesion, a procedure of value in determining the location of the stenotic area and its length, preoperatively. Early surgical intervention seems to be the treatment of choice in order to prevent cardiac decompensation, subacute bacterial endocarditis, atheromatous aortic changes and rupture, and intracranial hemorrhage *(6, 8)*. The procedures being used are (1) excision of the coarctation and anastomosis of the left subclavian artery to the distal aorta, (2) removal of the coarctation and end-to-end reconstruction of the aorta, or (3) excision followed by a graft insertion to bridge the gap.

CONCLUSIONS

Coarctation of the aorta is an unusual abnormality, especially in children, the diagnosis becoming somewhat more difficult the younger the child. The symptoms and signs are not as typical in children as in adults yet it is important to make an early diagnosis in order that surgical correction may be undertaken before hypertensive and degenerative changes occur. Often the child is asymptomatic, without a history of dyspnea, excessive fatigue, or leg complaints. Physically, there may not be chest deformity, collateral circulation, or abnormal pulsations. Weakness or absence of the femoral pulse and lowered blood pressure in the legs are pathognomonic when present, but in young children these may not be observed. The precordial and interscapular murmurs, commonly seen in the adult, may be of less assistance in the child. Likewise, the roentgenogram of the chest revealing an enlarged cardiac silhouette, rib notching, and absent aortic knob in adults often may not be present during the first decade. Arteriography may be of value in locating the stenotic area. It is important to be highly suspicious of coarctation in a child whose history and physical signs are suggestive of a cardiac abnormality and to palpate for the femoral and radial pulses simultaneously, in addition to recording the blood pressure in the arms and legs.

BOOKS RECEIVED

Post-Graduate Lectures on Orthopedic Diagnosis and Indications, by *Arthur Steindler,* M. D., F. A. C. S., Professor of Orthopedic Surgery, State University of Iowa, Iowa City, Iowa. Volume III, Section A: Tuberculosis of the Skeletal System; Section B: Osteomyelitis. 284 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $8.75.

An Introduction to the Study of Viruses, by *Kenneth M. Smith,* F. R. S., Director of the Plant Virus Research Unit, Agricultural Research Council, Molteno Institute, Cambridge. 106 pages; illustrated. Sir Isaac Pitman & Sons, Ltd., London, England, publisher, 1950. Price $2.75.

BOOK REVIEW

An Atlas of Normal Radiographic Anatomy, by *Isadore Meschan,* M. A., M. D., Professor and Head of the Department of Radiology, University of Arkansas School of Medicine, with the assistance of *R. M. F. Farrer-Meschan,* M. B., B. S., (Melbourne, Australia). 593 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $15.

"Before the student or resident can learn pathologic concepts in radiology, a basic knowledge of the normal must be obtained," Dr. Meschan states in the preface of his text. Teachers of radiology have long stressed this idea but a compact, descriptive text of normal radiographic anatomy has not before been available to the student. This excellent atlas fulfills a long-standing need. The initial chapters are devoted to fundamental concepts. The first chapter gives a concise description of the basic equipment and methods necessary for the production of a satisfactory radiograph. The second chapter deals with the macroscopic and microscopic development of bone. Succeeding chapters describe the normal anatomy of the various portions of the human body with necessary emphasis on the skeletal system.

An illustrated discussion of the related gross anatomy and the radiographic studies of the specific region is contained in each chapter. The reproductions of normal radiographs are accompanied by labeled tracings which clearly identify each of the visualized structures. In addition, there is a concise description of the method of positioning the patient for each of the radiographs. All of the routine and special procedures are noted with comments on the value of each procedure. The special sections include the vascular system and pneumoarthrography of the knee. The chapters on the skull and the vertebral column are excellent. The illustrations are uniformly good and clearly labeled with ample charts and graphs to make the description complete. This text should be a welcome addition to the library of residents in radiology and to all who are interested in the correlation of morbid and radiographic anatomy. It will also be valuable to the teacher of radiology as a fundamental text for residents and a reference text for technicians.

—Lt. Col. V. L. Lester, MC, U. S. A.

Indications and Technic for Root Resection

Melvin Kaplan, *Captain, DC, U. S. A.*

THE operation of root resection (apicoectomy) following, or in conjuction with, root canal therapy is an old one and is well known. It was probably first practiced in this country by Farrar *(1)* and Brophy *(2)* before 1880. Root resection and/or periapical curettage adapt themselves especially well in clinics of the type found in the Armed Forces.

Grossman *(3)* gives 3 factors which must be considered in deciding to perform root canal therapy and Coolidge *(4)* gives 2 more: (1) the general health of the patient, (2) the degree of periapical involvement, (3) accessibility, (4) the strategic value of the tooth to the patient either in the natural arch or as an abutment, and (5) the ability of the dentist to carry out adequate treatment. These same factors must be considered when performing root resections. Root canal therapy and root resection should be performed only on relatively healthy patients. General systemic diseases, such as active diabetes, tuberculosis, syphilis, nephritis, anemia, and cardiac conditions, are definite contra-indications. In the Armed Forces our patients are usually young men and women in the healthiest and most vigorous period of their lives.

Root resection is indicated when there is destruction of the periapical tissues, bone, or periodontal membrane but not when this destruction involves more than one-third of the root apex. Accessibility and position in the mouth are important considerations in root resection. Only the anterior teeth, especially the 6 upper anterior teeth, are suitable for an apicoectomy. From the first bicuspid back we usually run into difficulties because of the proximity of the root apexes to the maxillary sinus in the upper arch and the mental foramen and mandibular canal

(1) Farrar, J. N.: Radical and heroic treatment of alveolar abscess by amputation of roots of teeth. Dental Cosmos 26: 79, 1884.

(2) Brophy, T. W.: Caries of superior maxilla. Chicago M. J. & Exam. 41: 582, 1880.

(3) Grossman, L. I.: Root Canal Therapy. Lea & Febiger, Philadelphia, Pa., 1946. p. 312.

(4) Coolidge, E. D.: Root resection as cure for chronic periapical infection; histologic report of case showing complete repair. J. Am. Dent. A. 17: 239-249, Feb. 1930.

in the lower arch. Furthermore the root apexes are more accessible in these anterior teeth and esthetically it is more important to the patient to retain a natural anterior tooth than a posterior one.

To make root resection worth the time and effort involved, the tooth must be one that both the patient and dentist wish to retain in the mouth. Among young patients we naturally find the greatest desire for retaining the anterior teeth. No artificial restoration in this part of the mouth is nearly as satisfactory esthetically and functionally as the natural tooth. Certain teeth, such as the cuspids, are strategically important in the mouth. They form the corners of the face and are difficult to replace satisfactorily. The replacement of anterior teeth in general and in the lower arch in particular often presents a difficult problem in fabrication and esthetics. Many dentists believe that pulpless teeth can be used satisfactorily as bridge abutments. Tylman stated that "pulpless teeth serve satisfactorily as bridge abutments if the tooth is carefully treated, filled, and kept under periodic surveillance."

If the patient load is heavy and time is an important factor as it is in the dental clinics of the Armed Forces, root therapy with apicoectomy is especially indicated. A fairly skilled operator can perform the root therapy and apicoectomy in a 1-hour sitting with ease. To extract and then replace this tooth with a fixed bridge would require from 6 to 8 1-hour sittings. Assuming that the results would be as satisfactory esthetically and functionally as those following the retention of the natural tooth, we still lose many chair-hours by not performing a root resection when indicated.

The technic which I use for root resection is simple but is only one of many which can be used satisfactorily and each operator will probably develop refinements of his own. Grossman *(3)* describes these technics in detail.

On the day before the operation 300,000 units of penicillin are injected intramuscularly; 300,000 units are given on the day of the operation; and 300,000 units on the day after operation. The only sedation used is 0.6 gram of aspirin given immediately before starting the root resection and instructions are given to repeat this dose every 2 hours afterward as needed.

A sterile working field in the mouth is impossible to achieve, but our aim in performing root therapy and root resection is to keep as clean a field as possible so as not to introduce any additional organisms into the field of operation. Procaine is injected over the root of the tooth, in the upper arch, and sometimes the operator may also desire to use an incisive injection into the anterior palatine foramen. Both conduction and infiltration anesthesia are used in the lower arch. This anesthesia is usually sufficient for the entire procedure, but can be supplemented at any time.

A rubber dam is placed on the tooth to be treated. The canal is then opened and the pulp removed from the pulp chamber and root canal. The canal is then reamed and filed to the size desired by the operator and thoroughly irrigated with sterile water to remove any remaining root particles. The canal is then sterilized by whichever chemical or electrical means the operator may choose. After the canal is open, cleaned, and sterilized, it is packed with sterile paper points. An opening is cut in the rubber dam over the root of the tooth and the entire area is dried and painted with merthiolate. Sterile packs (cotton rolls or gauze) are placed in the vestibule on either side of the immediate field of operation.

A semilunar incision with the convexity toward the incisal edge is made about 3 mm. below (or above in the lower arch) the mucobuccal fold extending the width of 1 tooth on each side of the tooth to be operated on. The mucoperiosteum is peeled back with a periosteal elevator exposing the bone. If the bone is necrotic over the apex of the tooth, there will be no difficulty finding the root end; but, if not, a window must be made in the bone over the root apex exposing it. This window can be made with a surgical bur, a large round bur, or with surgical chisels and a mallet. The window should be large enough to allow the removal of the necrotic tissue and expose the root tip, but should leave enough bone to support the tissue flap when sutured back.

All necrotic tissue is removed with curets and surgical burs and the opening thoroughly irrigated and cleaned. Procaine, being sterile and isotonic, is an ideal irrigating solution. The root end with the protruding paper point should be clearly visible. Sterilization of the canal is completed and the canal is overpacked with gutta-percha points moistened and, thereby, softened in chloroform. The root end is cut off with the surgical bur or with surgical chisels and a hot burnisher is applied to the stump to seal off the gutta-percha. The root stump is filed smooth and the entire area is again irrigated and cleaned. Either gauze packs or an aspirator may be used to remove the blood and irrigating solutions, but the aspirator is preferable. A paste containing penicillin and streptomycin in linseed oil is packed over the root stump and the flap is closed. The sutures may be removed on the third or fourth day.

The patient is instructed to apply ice packs to the lip (10 minutes on and 10 minutes off) for a few hours after the operation to reduce the swelling. Some discomfort is to be expected after the anesthesia wears off but acute pain seldom occurs. On the day after the root resection the chamber is cleaned of excess gutta-percha and blood stains by a round bur and cement is packed into the chamber until a more permanent restoration can be placed. Cleaning dried blood, debris, and exudate from the chamber is important because it is the decomposition of these substances in the dentinal tubules which cause discoloration of many nonvital teeth.

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In many cases periapical curettage can be substituted for root resection, especially when the area of rarefaction is small and easily accessible to curettage without the removal of the root apex.

The percentage of successful results following an apicoectomy is very high. Blum *(5, 6)* reported successful regeneration of bone in 95 percent of 200 patients and Phillips and Maxmen *(7)* reported that 99 percent of their series of more than 600 operations were successful. In more than 75 root resections which I performed in the past year, I noted only 2 failures. Unfortunately, in the Armed Forces we cannot follow our patients long enough to determine definitely the degree of success, but the great preponderance of evidence supports the view that root canal therapy followed by root resection has an important place in military dentistry.

CONCLUSION

Root canal therapy with root resection is an ideal procedure in many patients in the Armed Forces, but, as with any other procedure, we must carefully select our patients. Root resection is not a panacea for all abscessed teeth. Any technic may be used successfully in root resection as long as it satisfies the operator and the conditions under which he must operate. Sterility, or as near sterility as possible, is an important factor to remember in any surgical procedure (including root resection). The technic here described has the advantage of (1) requiring only one sitting, (2) ease of completely irrigating, sterilizing, and filling the canal, and (3) ease with which we can locate the root apex by inserting instruments through the canal. Procaine should be used for irrigation and antibiotics should be used for premedication and topical application. One great objection to root canal therapy, the discoloration of the tooth, can be overcome by thoroughly removing all blood, exudate, and debris from the chamber before final closing.

(5) Blum, T.: Additional notes on root amputation, including study of 38 new cases. J. Am. Dent. A. 19: 69, 1932.

(6) Blum, T.: Life span of teeth whose roots have been resected. New York J. Dent. 15: 60, 1945.

(7) Phillips, W. H., and Maxmen, H. A.: Practical root resection technique for young permanent anterior teeth. Dental Digest 47: 60, 1941.

Persistent Umbilical Urachal Sinus[1]

Orland G. Davies, Jr., *Captain, U. S. A. F. (MC)*

William S. Gaines, *Captain, U. S. A. F. (MC)*

THE rare congenital disorders of the umbilicus are seen even less frequently in hospitals of the Armed Forces because these conditions usually manifest themselves in early childhood. Anomalous closures of the omphalomesenteric duct and urachus have been classified by Cullen (2) and others (3, 4). A sinus tract or fistula of either the omphalomesenteric duct or urachus should be considered in the presence of any persistent discharge from the umbilicus.

CASE REPORT

A 23-year-old man was admitted to this hospital in February 1951 because of an urticarial rash following the administration of procaine penicillin for acute prostatitis. A history of persistent, painless hematuria and bloody ejaculation on 2 occasions during the preceding 2 months was obtained. About 2 months prior to admission he had noted for the first time an irritation of the umbilicus associated with small amounts of serosanguineous discharge. There was at no time any fecal or urinary discharge from the umbilicus. Questioning of the patient's parents revealed no knowledge of an abnormality in the region of the umbilicus other than a small umbilical hernia which disappeared during the first year of life.

On physical examination the umbilicus was found to be filled with bright red, polypoid granulation tissue (fig. 1). This polyp failed to produce the "sticky string" sign for mucus, as described by Potts and cited by Fox (5). The patient was transferred to the surgical service for further investigation.

(1) From U. S. Air Force Hospital, Hamilton Air Force Base, Hamilton, Calif.

(2) Cullen, T. S.: Embryology, Anatomy, and Diseases of the Umbilicus Together with Diseases of the Urachus. W. B. Saunders Co., Philadelphia, Pa., 1916.

(3) Ladd, W. E., and Gross, R. E.: Abdominal Surgery of Infancy and Childhood. W. B. Saunders Co., Philadelphia, Pa., 1941.

(4) Trimingham, H. L., and McDonald, J. R.: Congenital anomalies in region of umbilicus. Surg., Gynec. & Obst. 80: 152-163, Feb. 1945.

(5) Fox, P. F.: Uncommon umbilical anomalies in children. Surg., Gynec. & Obst. 92: 95-100, Jan. 1951.

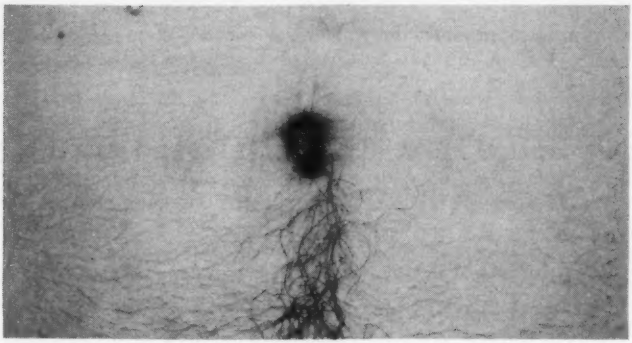

Figure 1. Photograph showing the polypoid granulation tissue filling the umbilicus.

It was found by gentle probing that the tip of a small rubber catheter could be passed through the umbilical ring and directed toward the symphysis for a distance of about 3 inches. This tract was injected with lipiodol and the patient noted that pressure during the injection resulted in a burning pain referred to the base of his penis. Roentgenograms revealed a poorly filled, cystic cavity extending 3 inches below the umbilicus (fig. 2). The patient was further studied by cystoscopy and retrograde pyelography. The interior of the bladder was smooth and normal in appearance. The hematuria was accounted for by an acutely inflamed trigone and posterior urethra which bled freely under the direct vision of the panendoscope. Retrograde pyelograms were normal. Cystograms did not demonstrate any tract leading from the urinary bladder. A small bowel series failed to show any evidence of Meckel's diverticulum or fixation of the small bowel at any point.

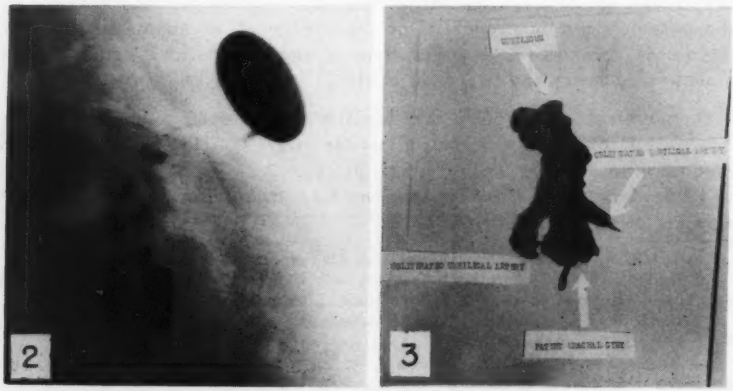

Figure 2. Roentgenogram of the sinus tract filled with lipiodol. The umbilicus is marked by a coin. Figure 3. Gross appearance of the specimen following removal. Note the obliterated urachal tract at the lower end of the cyst.

A solution of crystalline penicillin and chloramphenicol was instilled into the sinus tract 24 hours prior to operation. The urinary bladder was filled with dilute methylene blue just before operation. The umbilicus and the patent urachal sinus were removed en bloc through a midline incision below the umbilicus. The obliterated urachal sinus below the cyst was followed to the dome of the bladder where the tract was divided and the distal end transfixed. There was no evidence of communication with the bladder either grossly or microscopically. The urachal cyst itself was chronically inflamed, thick-walled, and so intimately associated with the peritoneum that entry into the free peritoneal cavity was unavoidable (fig. 3). On exploring the lower abdomen there was no evidence of Meckel's diverticulum or congenital bands associated with the umbilicus. The patient made an uneventful recovery and was returned to duty 18 days after operation.

BOOK REVIEWS

The Porcelain Jacket Crown, A Manual Stressing the Preparation of Normal and Abnormal Teeth, by *S. Charles Brecker,* D. D. S., Former Assistant Professor of Operative Dentistry, New York University, College of Dentistry. 263 pages; 290 illustrations. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $8.

This text is devoted entirely to one of the most esthetic dental restorations—the porcelain jacket crown. The author discusses in detail the preparation of the normal and the abnormal tooth as influenced by its condition and position in the dental arch. Most of the failures of this restoration have been due to inadequate preparation of the tooth. Chapters have been written on the procedures following the completion of the preparation of the porcelain jacket crown and on the shortcomings of this crown and how to prevent or minimize them. Several chapters include fixed bridge construction and the correction of abnormal spaces in adults through the use of ceramic dentistry. The outstanding feature of this easily read book is the use of the 290 excellent photographs and drawings. This volume is highly recommended to all dentists.—*Capt. W. J. Marias, U. S. A. F. (DC)*

Hypertension, A Manual for Patients With High Blood Pressure, by *Irvine H. Page,* A. B., M. D., Director, Research Division, Cleveland Clinic Foundation, Cleveland, Ohio. 6th printing. 101 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $3.

This revised sixth printing of the first edition of this handy manual is intended for the hypertensive patient. It is highly readable and gives all the information necessary for the intelligent understanding of

this disease by the layman. As stated by the author, however, "It is not intended to exhaust either its subject * * * or the hypertensive who reads it." The first half of the book is devoted to the examination and description of the disease itself. The second half is concerned with its management. The author discusses briefly in simple language the various available modes of treatment and comments on their value. In this section he offers many practical suggestions and at times reaches inspiring heights in his italicized aphorisms and terminal plea for the increased support of research in this extremely important field. This manual is commended to every hypertensive patient whose physician has neither the time nor the talent to explain in detail the nature and treatment of this disease.

—*Commander H. L. Jones, Jr., MC, U. S. N.*

The 1951 Year Book of Radiology (June 1950-June 1951). Radiologic Diagnosis, edited by *Fred Jenner Hodges,* M. D., Professor and Chairman, Department of Roentgenology, University of Michigan, and *John Floyd Holt,* M. D., Associate Professor, Department of Roentgenology, University of Michigan. Radiation Therapy, edited by *Harold W. Jacox,* M. D., Professor of Radiology, College of Physicians and Surgeons, Columbia University; Chief, Radiation Therapy Division, Radiologic Service, Presbyterian Hospital, New York City, and *Vincent P. Collins,* M. D., Associate Professor of Radiology, College of Physicians and Surgeons, Columbia University; Director, Department of Radiation Therapy, Francis Delafield Hospital; Attending Radiologist, Presbyterian Hospital, New York City. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1951. Price $7.

This Year Book presents abstracts of more than 350 articles. The literature from about 100 journals has been reviewed. Many significant papers appearing in foreign journals and local or regional journals only available in the larger libraries are abstracted, thus increasing the book's value to the average physician. Dr. Jacox and Dr. Collins of the College of Physicians and Surgeons, Columbia University, have succeeded Dr. Lampe and Dr. MacIntyre as editors of the section on radiation therapy. They have maintained the high standard we have come to expect of the Year Books of Radiology. Dr. Turner's comments on the Sixth International Congress of Radiology were most interesting. More space could have been devoted to this. As usual, the sections on technical developments and radiobiology are particularly stimulating. For most practicing radiologists, however, the sections on clinical radiology will continue to be the most useful. The editors are to be commended for their wise selection of the material included here.

—*Lt. Col. R. W. Lackey, MC, U. S. A.*

Nodular Vasculitis

William M. Enright, *Commander, MC, U. S. N.* (1)

IN considering a group of diseases producing nodules on the legs Montgomery et al. (2) listed nodular vasculitis, erythema induratum, erythrocyanosis, pernio, erythema nodosum, panniculitis, recurrent idiopathic thrombophlebitis, indurated cellulitis, and ulceration secondary to chronic venous stasis. O'Leary et al. (3) called attention to the difference between erythema induratum and periphlebitis nodularis necrotica and stated a preference for the term nodular vasculitis for the latter condition. Anderson (4) challenged the validity of the term nodular vasculitis and stated the only difference between that condition and erythema induratum was "the presence or absence of undoubted tuberculous lesion elsewhere in the body." O'Leary, however, stated that the histologic feature of nodular vasculitis consists of a pronounced involvement of arterial and venous blood vessels with a conspicuous absence of any tuberculous structure.

CASE REPORT

On 6 June 1950 our patient complained of swelling, pain, and tenderness of the left ankle. He stated he had an attack 6 months earlier which cleared up after a few days. He noticed pain in the medial aspect of the left foot over the first metatarsophalangeal area. He was admitted to a hospital overseas where physical examination revealed tenderness and swelling over the first metatarsophalangeal joint of the left foot with enlargement of the saphenous vein in this area. The condition persisted and on 21 September the area of swelling was excised together with the vein in the area. The pathologist examined the tissue and reported a granuloma, cause undetermined. Redness and swelling of the dorsal venous arch of the left foot appeared and that area together with a segment of the vein was removed. The area healed and the patient was discharged on 30 September.

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(1) U. S. Naval Hospital, Bremerton, Wash.

(2) Montgomery, H.; O'Leary, P. A.; and Barker, N. W.: Nodular vascular diseases of legs; erythema induratum and allied conditions. J. A. M. A. 128: 335-341, June 2, 1945.

(3) O'Leary, P. A.; Montgomery, H.; and Brunsting, L. A.: A case for diagnosis. Arch. Dermat. & Syph. 50: 212-213, Sept. 1944.

(4) Anderson, C. R.: Nodular vascular disease of legs. (To the Editor) J. A. M. A. 128: 1249, Aug. 25, 1945.

Three days after discharge he noticed a slight swelling and tenderness over the third and fourth metatarsal bones of his left foot. This area became progressively more tender and swollen and he was readmitted to the hospital where a tender swollen area 4 cm. in diameter was found over the midportion of the left fourth and fifth metatarsals. Nodules were palpated in this area. Laboratory and roentgenographic findings were negative. On 28 November the area was excised and the biopsy specimen was reported as granuloma of the dorsal venous arch left foot. The sutures were removed on the tenth postoperative day and the wound healed without sequelas. On 31 December this patient again noticed swelling and tenderness of the dorsum of the left foot, between the two previous incisions and a larger nodule which was red and tender proximal to the old incisions. He was readmitted to the hospital on 2 January 1951. The physical examination was essentially normal except for the left foot which showed two well-healed scars from previous operations, a tender reddened nodule over the fourth and fifth metatarsals proximal to the old incision, and another distal to the incisions over the third metatarsal. A roentgenogram of the foot was negative. All the biopsy specimens were diagnosed granulomatous thrombophlebitis (fig. 1). This diagnosis was confirmed by the Armed Forces Institute of Pathology.

The patient was then transferred to the United States for further treatment. On admission to this hospital on 7 March the physical examination was negative except for the reddened tender nodules previously described. Both femoral and dorsalis pedis pulsations were palpable. The temperature of both feet was equal to palpation. No femoral or inguinal adenopathy of significance was noted. On 12 March tender reddened nodules over a vein in the upper half of the left calf were noted. These extended along the vein for about 2 inches. This area was excised on 14 March and showed thickening of the adventitia and intima and inflammatory reaction about the vessel. On 1 April he was transferred to the medical service. Further examination revealed mild maceration on the sole in the area of the anterior arch and between the toes of the left foot. A similar but milder condition was noticed on the right foot. A fungus infection was suspected and a culture was made on 17 April.

On 23 April treatment for fungus infection of the feet, including soaks, keratolytic solution and powder was started. By 27 April the maceration of the feet was improving and the painful areas and nodules were subsiding. The culture was positive for *Monilia albicans*. On 9 May the painful areas on the calf and dorsum of the foot were completely resolved leaving only slight residual pigmentation and swelling. On 18 May the patient was completely asymptomatic without evidence of previous disease except for the surgical scars. When last seen on 20 July he was asymptomatic.

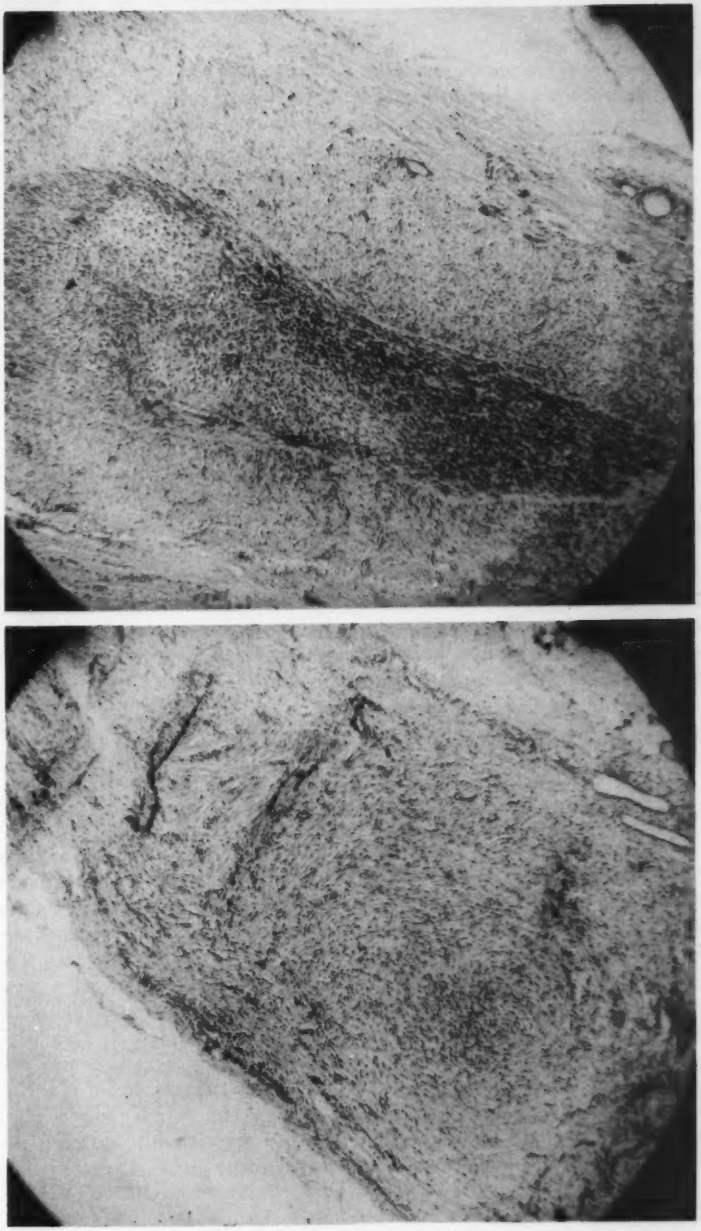

Figure 1. Two photomicrographs of the nodules from the dorsum of the left foot.

SUMMARY

A patient with recurring nodular vascular lesions of the leg of 18 months' duration was found to have a local fungus infection on the foot. His lesions cleared up promptly when the fungus infection was treated. No conclusions as to the relationship between monilial infection and nodular vasculitis can be drawn. Weidman in discussing Anderson's article *(4)* stressed the importance of the role of dermatophytosis in producing an allergic mechanism responsible for spasm and thrombosis of the vessels of the lower extremities. In this case there was a granulomatous reaction in addition.

BOOK REVIEW

Some Common Psychosomatic Manifestations, by *J. Barrie Murray*, M. A., M. D. (Cantab.), M. R. C. P., Diagnostic Physician, Tavistock Clinic; Physician, Bolingbroke Hospital, London. 2d edition. 285 pages. Oxford Medical Publications. Oxford University Press, New York, N. Y., publisher, 1951.

The book is a rather confusing catalog of some psychosomatic manifestations, but the emphasis is not on common ones. Miners' nystagmus, an instructive account, occupies about 40 percent of the text and effort syndrome, another 25 percent, but where, for instance, are headache and dysmenorrhea. Proctalgia fugax is here but not peptic ulcer. In defining the term "psychosomatic," the author states: "Emotion is expressed as a physical symptom." Fear and worry are recognized as prominent emotions, but one looks in vain for mention of anger, love, guilt, hate, sorrow, or the various conflicts of feelings.

The author has keen appreciation of, and insistently cautions against, the physician inducing or perpetuating neurotic physical symptoms by indecisiveness and unnecessary examination. Only 12 pages are given to psychotherapy. This is composed of walloping doses of omniscient attitude, authoritative explanation, reassurance, and exhortation. The book is apologetically directed to the general practitioner as a communication "concerned entirely with the physical expressions of emotions irrespective of the personalities of the patients." This lack of consideration of personality patterns constitutes a fundamental and glaring defect. One, therefore, expects the practitioner to be discouraged, baffled and mired. His great need is for words which offer penetrating and instructive insight into the relationship between the patient's personality and the patient's complaint.

—*Commander R. D. Sherman, MC, U. S. N.*

Dentistry in the Army

Edward M. Karow, *Captain, DC, U. S. A. (1)*

THE mission of the Dental Corps is the same as that of the Medical Department itself—to preserve the fighting strength. By order of the Surgeon General, all duty personnel must be surveyed once a year. This survey is for the purpose of classifying the personnel so that the Surgeon General can see at a glance the relative state of oral health. The survey is not necessarily as complete and thorough an examination as can be made. Its completeness is determined by the exigencies of the situation and the surroundings. In order to effect uniformity in the nomenclature and definitions used in the Department of Defense with respect to dental examinations and classification, the following specifications and definitions have been formulated:

Type 1. Ideal examination. Mouth mirror and explorer examination; adequate natural or artificial illumination; full mouth intra-oral, periapical and posterior bite-wing roentgenograms. When indicated, percussion, thermal, and electrical tests, transillumination, and study models are used.

Type 2. Routine examination. Mouth mirror and explorer examination; adequate natural or artificial illumination; posterior bite-wing roentgenograms; periapical roentgenograms, when indicated.

Type 3. Modified routine examination. Mouth mirror and explorer examination; adequate natural or artificial illumination.

Type 4. Screening examination. Mouth mirror and explorer or tongue depressor examination; available illumination.

In the field, during maneuvers and bivouacs, tongue blade and flashlight examination is all that can be made. In camps, stations, and hospitals, the mirror and explorer, and any other diagnostic aid which might be necessary, are used. As each person is examined, he is roughly classified as to the type of dental work he will need. As part of the physical examination for all those who are entering the military service, and also for those who are being separated from it, the type 2 examination is mandatory. Bite-wing roentgenograms are taken for

(1) Percy Jones Army Hospital, Battle Creek, Mich.

all these patients and the findings recorded on the patient's chart under the headings of entrance examination and separation examination. The type of interim examinations given the soldier will depend on circumstances.

From the lists compiled as a result of survey, the patients are called in for appointments according to the category in which they were placed. At any time, any patient who has reported to a unit between surveys may request a routine examination by going through the regular sick call channels. Also, any person with a toothache or any other oral discomfort may go to the dental clinic for an emergency examination. Any of the patients who have any pain or ache are treated immediately for relief of this pain. Once dental work has been started, the patient is reclassified by the operating dentist. For instance, as the exodontist completes his work, he will reclassify the patient from the oral surgical category to the operative, periodontal, or prosthetic category as indicated by the type of work which still remains to be completed. In this way, we can keep a running or perpetual inventory of the type of work each patient is undergoing at any time.

In each of these examinations, except the survey, each cavity is charted, all missing and replaced teeth are noted, the occlusion and the condition of the periodontal tissues are observed and recorded, and, finally, a tentative treatment plan is recommended. For soldiers who are being sent overseas we also list the location and the kind of restoration, if any, present on each tooth in the mouth. Two copies of this examination are made and labeled Dental Identification Record. One copy is sent to The Adjutant General's Office, and the other goes into the soldier's 201 (personal) file. All of this sounds like a tedious process, but it is not. Most of it is done with symbols. The notation of caries, missing teeth, et cetera is easily and routinely accomplished. The only part which could consume time and space would be the treatment plan, and this is symbolized by classifying each patient according to the condition of his mouth, thus automatically indicating the treatment. The new system of classification recently adopted by the Armed Forces is shown in table 1.

Patients in an Army hospital are treated in a slightly different way. As soon as they are ambulatory, all patients are sent to the dental clinic where they are given a routine examination and classified. With their dental chart comes a medical consultation form which gives their principal medical diagnosis. If this is any condition in which a focus of infection could play a part, then a full series of roentgenograms are routinely taken and studied with this possibility in mind. Blood counts and urinalysis are ordered whenever we feel it necessary. Conversely, whenever we discover a patient whose gingival or mucosal tissues do not respond to normal dental treatment and their medical diagnosis is not consistent with this lack of response to treatment, we may ask the medical service to search further for some secondary

TABLE 1. *Classification of personnel**

Class 1. Persons requiring no dental treatment.

Class 2. Persons requiring routine but not early treatment of such conditions as:

a. Moderate calculus.

b. Prosthetic cases not included in class 4.

c. Caries (not extensive or advanced).

d. Periodontal diseases (not extensive or advanced).

e. Oral conditions requiring corrective or preventive treatment.

Class 3. Persons requiring early treatment of such conditions as:

a. Extensive or advanced caries.

b. Extensive or advanced periodontal disease.

c. Pulpal or apical infection (root canal therapy).

d. Chronic oral infections.

e. Heavy calculus.

f. The need for removal of one or more teeth or other surgical procedures not included in class 5.

Class 4. Persons requiring essential prosthetic appliances, including:

a. Those with insufficient teeth to masticate the service ration.

b. Others in need of an appliance essential to their duty.

Class 5. Persons requiring emergency dental treatment for such conditions as:

a. Injuries.

b. Acute oral infections such as parietal and periapical abscesses, Vincent's infection, acute gingivitis, and acute stomatitis.

c. Painful conditions.

*Only active military personnel (including foreign personnel) are classified according to this table. All other personnel are classified as "Complete" or "Further treatment necessary" (FTN).

ailment or disorder. Thus the patient benefits from the close cooperation between the medical and dental services. We also have at our disposal a photographic, slide, and graphic arts service for any type of work which we may wish to record permanently and a fully stocked reference library with all the latest periodicals and reference books.

The dental service in this hospital is so organized that the patient is first directed to the reception room which communicates with the front office. Here the patient's name, rank, serial number, organization and age are entered on a dental survey form. This will be a permanent record, and after all work has been completed it is sent to the Central Records Office, St. Louis, Mo., where it is filed with the soldier's other records, and is readily available if it is needed by another hospital in the Army or in the Veterans Administration.

At this first stage of processing, the examining officer charts all missing teeth and all carious lesions, orders such roentgenograms as are required, and, after suitable study of these films, formulates a tentative treatment plan. The chiefs of all the other sections of the dental clinic may be called in to consult as to the advisability of certain procedures. If a systemic condition may have an influence on the dental procedures, the chief of the appropriate medical section is called on for advice. After all these facts and opinions are correlated and the final recommendation noted on the patient's chart, the work of the section of Oral Examination, Diagnosis and Treatment Planning is performed. The responsibility for the proper execution of the work is left to the section chief.

From the examining room, the patient is sent either to the dental hygienist for a prophylaxis, or to the oral surgery section. It is the policy of the dentist anywhere to relieve pain or to remove any potential source of pain before any other treatment is started. Many times teeth which are infected and have to be removed are not associated with any acute symptoms. In private practice it is sometimes advisable to postpone these extractions for psychologic or other reasons. Unfortunately, in the military service these niceties cannot always be observed. Because a soldier must be kept in the best possible physical condition at all times in order to minimize lost working days or hours, and because he might be transferred on short notice to a new outfit where his dental survey will not follow, it is advisable to remove all infected teeth as soon as possible whether they are chronicly or acutely infected. This may explain the often-heard complaint that "all those Army dentists do is extract teeth." During World War II, the need for trained infantry men was so acute that in many cases all that was done for many of them was to extract these infected teeth. Precious minutes could not be taken away from their military training for other necessary restorative and replacement work, but, before embarking for overseas, all necessary restorations and replacements were made.

Another important phase of work accomplished in the oral surgery section is the preparation of the mouth for oral prosthesis. Here we can give the patient the best of treatment, including consultation with the chief of the prosthetic section, study-casts, and plastic guides. Every accepted means for attaining a good foundation for the dentures is explored and carried through to completion. During any war, there will always be patients who need maxillofacial and plastic operations. Civilian consultants in this field are available in our large general hospitals.

From the oral surgery section, the patient may be referred to the operative dentistry, or to the periodontal, or directly to the prosthetic section. At this hospital there is a separate section for periodontal treatment. Every patient with symptoms of periodontoclasia has a

full series of roentgenograms, including bite wings, and is referred to the periodontia section where the patient's mouth is restored to as nearly normal as possible. Not only are carious teeth restored to normal anatomic form and function, but there is no hesitation to perform extensive crown and bridge work and root canal therapy. Once the diagnosis and tentative treatment plan is indicated by the examining officer, the specific mode of treatment is left to the officer doing the work. Because 2 dentists, even from the same school, will rarely do any piece of work in exactly the same way, much can be learned by observing and discussing the various ideas and technics with different members of the staff. The dental officer is limited in the type of work he does only by his personal likes and dislikes. Every phase of dental work can be accomplished here except porcelain jacket work, for which we substitute acrylic jackets.

In any large group of patients there will always be many who need full or partial dentures. We not only get many battle casualties whose wounds necessitate full dentures, but also many who have lost sufficient strategic teeth to require a prosthesis. All types of prosthesis are constructed. Wrought and cast gold partial dentures are in the majority because we can make those most expeditiously in our own laboratory. Wrought bars are used only when we cannot wait for the lengthier laboratory procedures. If a patient will be hospitalized for any appreciable length of time, the models can be sent to a central dental laboratory where a vitallium casting can be made. Because this is more time-consuming, it is not done routinely.

Another phase of prosthetic work that has expanded greatly is the production of plastic eyeballs and plastic skull plates. This is an example of the close cooperation between the dental service and the eye, ear, nose, and throat and neurosurgery sections. The accuracy of our work and the speed with which it can be accomplished is truly gratifying. Surprisingly enough, this ability of our prosthetic department in a purely technical or mechanical phase of dentistry has elevated the dental service to a higher place in the eyes of the physicians. The frequent consultations in which we call on our medical colleagues has served to display in us a greater knowledge of medicine than they suspected we had and has shown them how pathetically weak has been their own training in recognition and treatment of oral conditions. Happily, this has led to an increased appreciation of each other's respective abilities and a fortunate lack of hesitancy in calling on each other for help.

When the patient's prosthesis is completed, he is reclassified by the prosthetic officer into category 1. His record card is kept on file for 6 months, after which it is sent to the Adjutant General's Office, whence it is forwarded to the Central Records Office.

I believe that the future of dentistry will rise or fall in proportion to the degree of dental education of the patients. The greater the

number of people who can be made to comprehend the basic idea behind preventive dentistry, the easier it will be for the dentist to do good work. At this hospital we attempt to do this work by performing all phases of (1) emergency dentistry (removal of infected teeth and replacement fillings), and (2) preventive dentistry, including periodontal treatments, prophylaxis, root canal therapy, and replacement of missing teeth.

Every dental patient is given a prophylaxis and during this treatment the need for regular prophylaxis is stressed and the proper tooth-brushing technic is demonstrated. Besides this, we broadcast to the wards at regular intervals a series of radio talks on oral hygiene. Each bed patient in this hospital has a private earphone and can listen in. These broadcasts are tape recorded and they are put on the air after sports programs which have proved to have a high audience count. The talks cover all phases of basic oral hygiene and attempt to answer some of the questions commonly put to the dentist. It is difficult to measure the exact audience reaction, but we believe that as long as the radio is available, we should make every effort to continue this educational program.

The problem of professional stagnation is always a threat to the alert and conscientious worker. Although much depends on the individual, external stimuli and guidance play an extremely important part in continuous self-improvement. At this hospital we have a weekly staff meeting for the dental officers at which each officer in turn presents an original article or reviews the current literature. In addition to these talks, any officer who has encountered an unusual problem is encouraged to describe it for the enlightenment of the group. Periodically, in addition to these staff conferences, civilian consultants address us on their specialties. We all have a standing invitation to attend the medical and surgical staff meetings, which are conducted on the same basis as the dental meetings just described. The professional knowledge to which we may be exposed is extensive.

In the summer, 2 groups of dental ROTC students come here for a 6-week period, during which time they are divided into 5 subunits—each unit spending 1 week in each section, where they observe the basic principles and technics of the section's work. In addition, throughout the 6 weeks, they are given lectures daily on basic dental subjects as applied in an Army hospital. These lectures are given by the regular staff members and by our consultants, all of whom are specifically scheduled at least once during each 6-week period. Lectures on such other topics as food service, medical field organization and problems, map reading, organization of the Army hospital, military courtesy, sanitation, et cetera are also given to these students by other members of the hospital staff. The lectures and the clinical observation have been found to be most stimulating to these students and having them around tends to keep the operating dentist on his toes.

We have also formulated a rotating dental intern program. The scope and duration of this program is as follows:

Examination, x-ray and diagnosis	1 month
Periodontia and basic sciences	2 months
Oral surgery	3 months
Operative dentistry	3 months
Prosthodontia	3 months

Each intern will be afforded the maximum opportunity to observe representative cases and, as he progresses, will be expected to participate in the care of the patients and assume charge of the treatment of selected patients under the supervision of a staff member. He will be given ample opportunity to observe normal and abnormal conditions in all types of patients. Special emphasis will be given to the pathologic effects of systemic dysfunctions and diseases on oral structures. In addition, ample opportunity will be given those who are interested in carrying to completion a research project of their own choosing.

Our enlisted technicians and chair assistants are trained in central dental laboratory schools prior to assignment. In this hospital periodic refresher courses covering the full scope of chair assistance and laboratory technic are instituted with the dental officers as the lecturers. This stimulates both officers and men to a higher standard of endeavor and leads to mutual respect.

CONCLUSION

Dentistry in an Army hospital can be a complete health service with the best definitive treatment available to the patients and great professional satisfaction to the dentist.

BOOK REVIEWS

A Textbook of Clinical Pathology, edited by *Seward E. Miller*, M. D., Medical Director, United States Public Health Service; Chief, Division of Occupational Health, Washington, D. C. (Formerly edited by *Roy R. Kracke* and *Francis P. Parker.*) 4th edition. 1,060 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1952. Price $9.

This new edition of a well-known textbook has incorporated an abundance of new material, presented in a manner which is commendable for its simplicity and clarity. Frequent revisions are necessary to keep a textbook in this field up to date. This edition will give any reader the information he seeks within its scope. It is especially valuable in that it not only gives the methods of technical procedure but gives the indications for such procedures, their interpretation,

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evaluation, and correlation with the patient's clinical condition. The chapter on assay of chemotherapeutic and antibiotic agents is a most useful and welcome addition both to the laboratory technician and the practitioner of medicine.—*Commander R. H. Walker, MC, U. S. N.*

The Prevention of Rheumatic Fever, by *Lowell A. Rantz,* M. D., Associate Professor of Medicine, Stanford University School of Medicine, San Francisco, Calif. American Lecture Series Publication No. 125, A Monograph in American Lectures in Circulation. 66 pages. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.25.

This is a concise little manual which briefly discusses the cause and pathogenesis of rheumatic fever, especially in its relationship to hemolytic streptococcal respiratory infection. The various methods used in the past to prevent rheumatic fever are concisely outlined and pertinent comments are made as to their practicability and value. Chemoprophylaxis is clearly outlined and the value of sulfanilamide, penicillin, and aureomycin as prophylactic agents are discussed. The work done at the Armed Forces Streptococcal Disease Laboratory in Wyoming on the prevention of rheumatic fever is considered in detail and commented on favorably. This manual should be of great value to any general practitioner or pediatrician as it clearly outlines the indications for chemoprophylaxis in patients with active and inactive rheumatic fever.—*Col. L. J. Numainville, MC, U. S. A.*

A Study of Antimetabolites, by *D. W. Woolley,* Member, The Rockefeller Institute for Medical Research. 269 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., publisher, 1951. Price $5.

This book correlates the scientific data, accumulated during the past decade, which indicate that the biologic functioning of diverse kinds of essential metabolic substances can be antagonized by the presence of other compounds closely related in chemical structure to them. Based on the facts accumulated, it is assumed that further study will result in useful pharmacologic agents. The introductory chapter of this book is very interesting to the clinician as it explains the discovery and development of ideas about antimetabolites. The remainder of the book is excellent in that it covers such aspects of the subject as the mechanism of action of antimetabolites, their spectrum of activity, their natural occurrence as participants in physiologic process as agents in diseases, their selectivity of action, applications to pharmacology and biochemistry, the designing of antimetabolites, and practical suggestions for synthesizing and testing them.

This book would be valuable chiefly as a reference, especially for students of deficiency diseases, pharmacologists, and biochemists.
—*Col. W. C. Berry, MC, U. S. A.*

One-Stage Pedicle Flaps to Repair Surface Defects of the Lower Extremity

Otto W. Wickstrom, *Captain, MC, U. S. N. (1)*

Joseph R. Connelly, *Commander, MC, U. S. N. (1)*

WITH recently improved bactericidal agents it is possible to repair deep surface defects involving bones, tendons, and nerves at an early date. In addition to the use of antibiotics parenterally, or by mouth, solutions have been divised for combating infection locally. For the past year a solution containing 1,000 units of penicillin per cc. and 10 percent urethane has been used in this hospital. Many of the massive surface defects of the lower extremity, grossly contaminated or infected, have been cleared promptly with the combined use of penicillin parenterally and local irrigations of the wound with the penicillin and urethane solution. No reaction from absorption of the drug in the wounds has been noted.

Weinstein and McDonald *(2)* observed the effect of urethane on 9 species of bacteria. In general, they stated that it is bactericidal for all gram-negative bacteria investigated. From this bactericidal effect it can be seen that when added to penicillin, most of the bacteria, be they gram-negative or gram-positive, will be affected by this solution. It is effective in infected wounds that are being treated by wide open drainage.

This makes it particularly valuable for battle wounds as such wounds are likely to be contaminated by gram-negative and gram-positive organisms. Neither drug delays wound healing and both are bactericidal against most of the organisms usually found in such wounds. This solution leaves wounds clean, bright, soft, and with good granulating tissue, making secondary closure of such wounds generally successful.

(1) U. S. Naval Hospital, Oakland, Calif.

(2) Weinstein, L., and McDonald, A.: Action of urea and some of its derivatives on bacteria: antibacterial activity of combinations of urea and urethane with sulfonamides and effect of carbamates on *para*-aminobenzoic acid and on solubility of sulfonamides. J. Immunol. 54: 131-144, Oct. 1946.

On arrival of the patients such wounds are evaluated and plans for the earliest possible closure of the surface defects are outlined. These procedures are carried out in conjunction with the orthopedic or neurosurgical departments when indicated. In planning this type of coverage it must be borne in mind that further repairs of the deep tissues are to be made by means of a pedicle flap. Wounds that have a bone, tendon, or nerve exposed require an adequate cover consisting of skin, subcutaneous tissue, and fat. A skin graft is not sufficient for defects requiring deep tissue repair. After the type of coverage is determined by evaluating whatever tissues are available, the extremity is prepared by thorough cleaning and débridement of the wound. The wound is dressed using the penicillin and urethane solution and a catheter is placed in the dressing to provide easy irrigation of the area. As a rule, the dressing is removed daily and irrigation is carried out in the depths of the wound. During the intervening time, the area is irrigated about every 3 hours, day and night. After 8 or 10 days it is frequently possible to cover such a wound with a one-stage pedicle flap. Delayed flaps brought from the abdomen, opposite thigh, or opposite lower leg, although providing excellent coverage, are time consuming and retard the repair *(3)*. By covering these defects as early as is consistent with the condition of the patient and cleanliness of the wound, osteomyelitis, scar contracture, and deformity can be reduced to a minimum. Blocker and Mithoefer *(4)* described a pattern or stemless type of one-stage flap that proved useful in covering certain types of defect in the extremities. This flap did not permit sufficient elevation of tissue for direct coverage of large wounds of the lower extremity. The type of flap described below permits early adequate coverage of lower leg defects with the expectation of a good blood supply to the flap *(5)*.

TECHNIC

In the elevation of a one-stage pedicle flap from the opposite calf, the size of the flap is determined by measuring the wound and a skin graft is secured from a suitable donor area. This skin graft is used to cover the defect left by elevation of the pedicle flap. Emphasis is placed on obtaining a skin graft without contamination from the main operative site. As a rule, a better type of graft is obtained by using a Padgett dermatome. Grafts of 0.015 inch usually provide sufficient thickness for the leg cover. The skin graft is laid to one side and elevation of the pedicle flap is begun. In outlining the flap on the calf, a base line is made 1 inch medial to the median border of the tibia. The flap is outlined over the rounded posterior portion of the calf, and is made in a half-moon contour, with the apex medial and posterior. The height of

(3) Wickstrom, O. W.: Plastic repair of surface defects in preparation for bone grafting. U. S. Nav. M. Bull. 49: 736-743, July-Aug. 1949.

(4) Blocker, T. G., Jr., and Mithoefer, J.: The pattern flap. Plast. & Reconstruct. Surg. 5: 163-167, Feb. 1950.

(5) Wickstrom, O. W., and Connelly, J. R.: One stage pedicle flap of lower leg. Plast. & Reconstruct. Surg. 8: 204-207, Sept. 1951.

the flap should not exceed more than one-half the width at the base. Any increase in the height of the flap decreases in direct proportion the available blood supply. It is possible to make successful flaps longer than this proportion, but the risk must be considered with each increase in length. The incision is made down to the fascia covering the muscle and the elevation is carried down to the base line of the flap.

At this point the saphenous vein is frequently visualized. If at all possible, the saphenous vein should be left intact. The skin graft is sutured in position to cover the defect left by elevating the tissues and is usually perforated to permit escape of serum. The skin graft is covered with bismuth tribromphenate and fluffs held in position with pressure retention sutures to maintain an independent dressing over the skin graft. When this is completed, the graft area is covered and there is no chance of contamination from the opposite leg. The method assures a uniform take of the skin graft on the nonaffected leg. The leg wound is then freed from scar and prepared to receive the flap. The legs are brought up side by side with the leg receiving the flap moving into position. The defects involving the medial or anterior portion of the lower leg can be covered in various locations from the foot to just below the knee. In this type of flap the legs are not crossed, but lie side by side. The flap is sutured in position and small Penrose drains are placed in the corners of the wound. The wound is dressed. Care is taken to place felt between the knee and the ankles. The dressing surrounding the flap and legs is voluminous, and secured with cotton elastic bandages. While held in position, plaster of paris is used to join the legs together over the thighs and feet. Cross sticks of suitable material are placed in the plaster to maintain the proper bend of the knees. After return from the operating room, pillows are used to support the encased legs until the next day, and then counterbalance is rigged on the overhead orthopedic bed to take off a portion of the weight of the cast. By means of this counterbalance the patient can turn from side to side in bed and is reasonably comfortable. The legs are kept in position for 21 days. Detachment is accomplished by the usual surgical procedure and the recipient and donor areas are trimmed and revised.

CASE REPORTS

Case 1. A 21-year-old marine suffered a gunshot wound of the right leg in Korea. The wound of entrance was on the lateral aspect of the lower one-third of the leg and the wound of exit was on the medial surface near the ankle. The patient sustained a compound fracture of the tibia and fibula. When admitted to this hospital for plastic repair of the defect, he was in extreme pain and clinically anemic. His left leg was in a plaster cast and a foul odor permeated the area. On removal of the cast, a large, dirty, necrotic wound 7 inches long and 3 inches wide was found on the medial surface of the right leg just below the ankle (fig. 1). The defect in the center of the wound showed a loss of 1 1/4 inches of the tibia. The foot appeared viable. The entire leg and wound were thoroughly cleansed with an antiseptic solution and much necrotic mate-

Figure 1. Gunshot wound of right leg. The tibial fragments are exposed in the wound. Figure 2. One-stage pedicle flap growing in position. The legs are held together by a cast. Figure 3. The healed wound.

rial removed from the defect. Dressings moistened with penicillin and urethane solution were applied. A catheter was placed in the dressing to facilitate irrigations. The patient was given 100,000 units of penicillin every 3 hours, and a transfusion of 500 cc. of whole blood. The transfusion was repeated on the next day.

Three weeks after admission the wound was clearing well. The patient was taken to surgery and a one-stage pedicle flap was elevated on the medial surface of the left calf (fig. 2). A split-thickness skin graft removed from the abdomen was sutured in position to cover the donor area. The graft was dressed with a pressure dressing held in place with sutures. The wound on the right leg was trimmed and converted into an oval shape by suture of angles of the area. The lower portion of the edge of the wound, not reached by the flap, was covered with a split-thickness skin graft. The exposed bone edges were trimmed and bone of doubtful value removed. The legs were maneuvered into position and the flap brought over to cover the defect. The flap was sutured to cover the wound area. Routine dressings were used and the legs held together with a plaster cast. The patient was given penicillin for 8 days and the flap healed nicely. On the twenty-first postoperative day he was taken to surgery. The cast was removed and under spinal anesthesia the flap was detached. The recipient and donor areas were revised, trimmed, and sutured into position. The affected leg was placed in a supporting posterior mold. The patient was given 100,000 units of penicillin every 3 hours. Forty-eight hours later the drains were removed from the lower edge of the flap. The postoperative course was uneventful. The small amount of drainage ceased by the tenth postoperative day (fig. 3).

The patient developed limited bony union at the fracture site of the tibia and 5 months later he was able to walk with a brace. While eventual bone grafting will probably be required, it was believed that a waiting period of several months would insure a better chance of success.

Case 2. A marine officer sustained a wound of the left leg in Korea. He was evacuated to Japan and later to this hospital. On admission the physical examination was negative except for a large granulating wound, relatively clean, over the anterior medial surface of the middle third of the tibia. The wound measured 6 by 3 inches. There were multiple tibial bone fragments in the fracture area. The entire leg was cleansed with an antiseptic solution and the loose bone fragments removed. The wound was dressed and a sterile catheter inserted. Penicillin and urethane solution was used to soak the dressing every 3 hours. The leg was placed in the posterior shell of a long leg cast. Seven days after admission he was taken to surgery and the wound was found to be clean and ready for operation (fig. 4). Under spinal anesthesia a one-stage pedicle flap was raised on the medial surface of the right calf similar to that described in the previous case (fig. 5). The flap healed without

incident. On the twenty-first day, under spinal anesthesia, the flap was detached and the donor and recipient areas were trimmed and revised. The donor area healed well, but the flap showed a small area of dehiscence on the lower border. There was a loss of tissue for about one-fourth of an inch. This healed later and the patient was given convalescent leave (fig. 6).

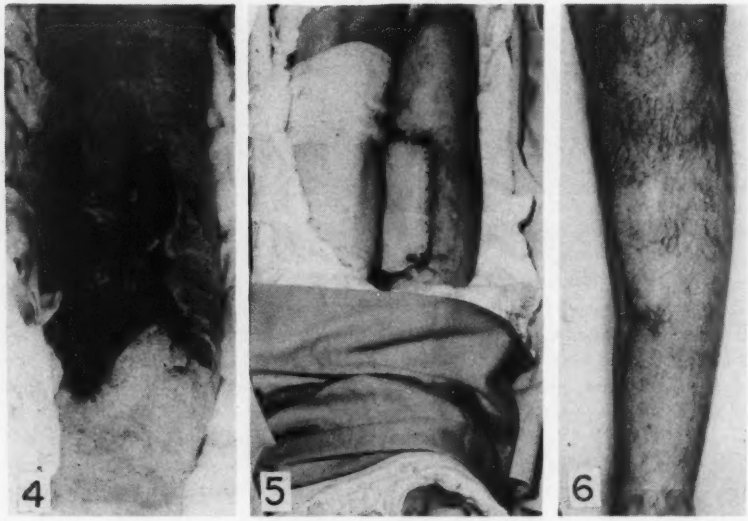

Figure 4. Gunshot wound of left leg. Figure 5. One-stage pedicle flap growing in position. Figure 6. The healed wound.

After complete healing of the grafted area, bony union occurred and the patient was able to walk with a brace. Seven months after injury, the leg remained well healed, with the soft tissues in good condition. Because of the marked bony loss the leg was not considered strong enough for weight bearing. Some bone will have to be added later to give it stability.

SUMMARY

The use of penicillin and urethane solution for wet dressings and irrigation has facilitated early repair of large, grossly contaminated and infected wounds. No untoward or systemic effects have been noted in over 1 year of its constant use. One-stage pedicle flap elevation from the medial side of the calf and transferred to cover defects of the opposite leg have been found to be practical and time saving. The flap should have a broad base, and the width of the base should be twice the height of the flap. The saphenous vein should be left intact. Flaps of this type provide early and adequate cover for wounds involving bones, tendons, and nerves.

Resilient Plastic Interdental Splint

Herbert J. Towle, Jr., *Commander, DC, U. S. N.*

John V. Niiranen, *Commander, DC, U. S. N.*

AS A safeguard against the possibility of injury to the teeth and jaws, it has been the practice of boxers, some football players, and other athletes to wear a standard rubber mouthpiece while engaging in the pursuit of their athletic activities. This stock appliance is "as ancient and as ineffective as a square wheel." Its shortcomings manifest themselves in (1) poor retention with resultant ease of dislodgment; (2) impairment of breathing, or even aspiration into the throat; (3) discomfort to the wearer because of unequal stresses on the teeth; (4) increased muscular distress and possibility of damage to the temporomandibular articulation, because of increased vertical dimension beyond tolerable limits for prolonged periods of time; and (5) the impossibility of talking; or of calling signals as a quarterback is required to do.

For the afore-mentioned reasons most football players prefer not to wear this appliance. The need for an improved means of protection is borne out by a recent survey conducted under the auspices of the University of Missouri *(1)*, which included 62 of the major colleges and universities in this country. In 4,000 men who participated in college football during the 1950 season 733 teeth were either chipped or knocked out. This is an appalling record.

In the hope of reducing the incidence of chipped or knocked-out teeth during athletic events, the Maxillofacial Prosthesis Section of the United States Naval Dental School, Bethesda, Md., has developed an improved mouthpiece made of a resilient vinyl resin. It fits snugly against the teeth and soft tissues, and therefore is not easily dislodged. At the same time, the wearer can talk or call signals with but little, if any, impairment of speech. The increased vertical dimension is practically nil (about 3 mm. at the incisors). The pressure of normal occlusion, and likewise the force of a blow, is distributed to all of

(1) Vanet, R.: Gridiron challenge. Dental Survey 27: 1258, Sept. 1951.

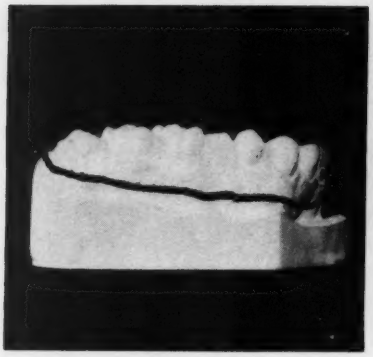

Figure 1.

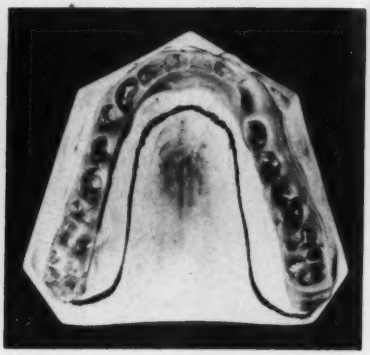

Figure 2.

the teeth, thereby greatly reducing the possibility of chipping or knocking out teeth. Because it may be worn for long periods of time with comfort, other usages suggest themselves, namely, as a protection for boxers, or as a treatment for bruxism and cheek biting.

CONSTRUCTION

The technic of constructing the splint is simple. A hydrocolloid impression of the maxillary arch is taken. This is poured in dental stone, permitted to harden, separated, and outlined as shown by the dark line in figures 1 and 2. A horseshoe wafer of 3 thicknesses of

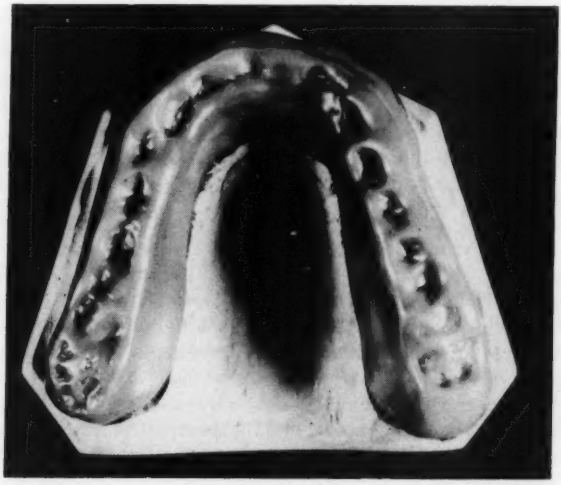

Figure 3.

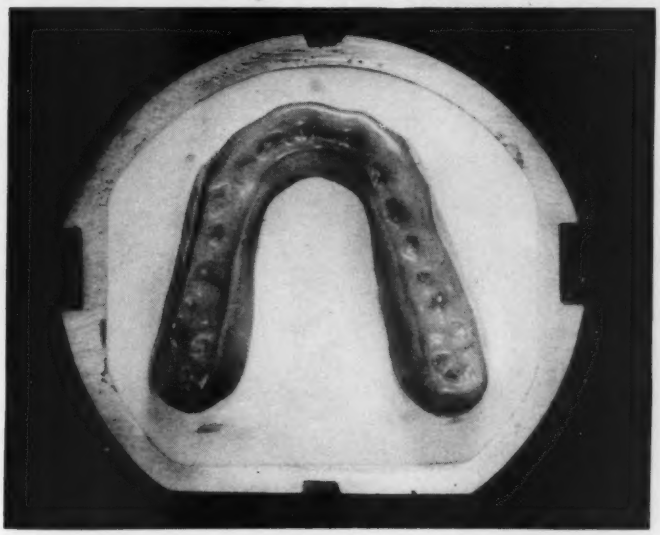

Figure 4.

baseplate wax is placed between the patient's teeth. He is instructed to close in centric relationship until within 2 mm. of normal closure. This should produce sharp imprints of both maxillary and mandibular teeth in the wax. The wax registration is seated on the occlusal surface of the stone model. The excess wax is trimmed as shown in figure 2. One layer of baseplate wax is added, and extended to the periphery as outlined on the stone model (fig. 3). This completes the waxing

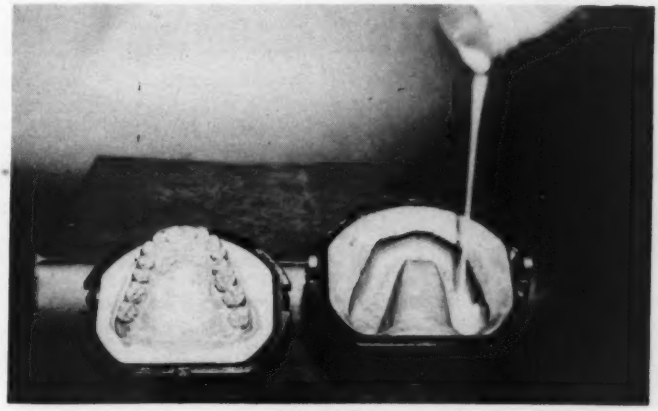

Figure 5.

of the case. The completed wax-up is half flasked as shown in figure 4. After a separating medium is applied, the wax-up is full flasked, using a stone core. After the flasking investment has set, the wax is boiled out.

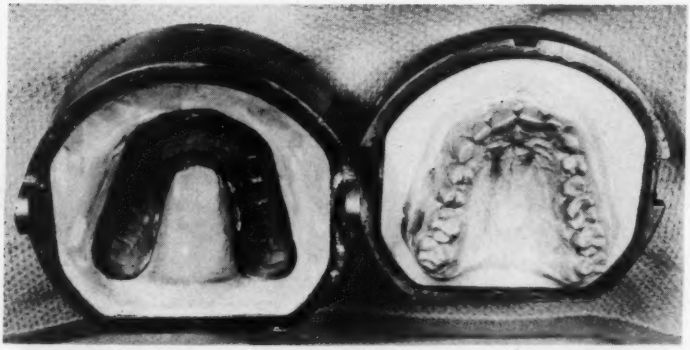

Figure 6.

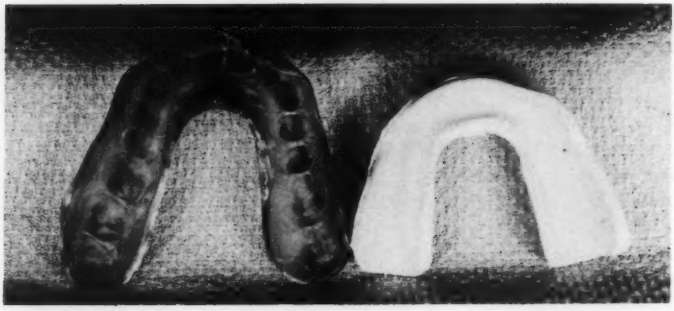

Figure 7.

While the case is still hot, but after the mold has dried, 3 coatings of paste floor wax are applied to act as a separating medium. The hot stone model is filled (fig. 5) with a liquid vinyl resin (elastomer 105, formulation 15 K), and the flask is closed. The flask is placed in a dry-heat oven at 150° C. for 1 hour. The flask is cooled in water and opened (fig. 6). The completed splint is removed from the flask, trimmed with scissors, and cleaned with soap and water. The completed splint shown on the left in figure 7 is compared with standard mouthpiece shown on the right. Complete cure of resin is indicated by a light purple color. If cure is incomplete, reheat on a piece of asbestos for 5 or 10 minutes at 150° C. or until the desired color results.

Rhabdomyosarcoma of Spermatic Cord

James L. Hansen, *Lieutenant Colonel, MC, U. S. A.* (1)
William F. Enos, Jr., *Major, MC, U. S. A.* (1)
O. K. Park, *Captain, U. S. A. F. (MC)* (2)
Allen H. Postel, *Captain, U. S. A. F. (MC)* (2)

SOLID tumors of the spermatic cord are rare. Patel and Chalier in 1909 made a complete review of the literature and at that time found only 89 cases reported. These were divided as shown in table 1.

TABLE 1. *Classification of series of 89 tumors of the spermatic cord*

Lipoma	37
Sarcoma and fibrosarcoma	22
Mixed tumors	13
Fibroma	12
Myoma	4
Carcinoma	1

In 1942, Strong (3) made a review of the literature and found 257 tumors of the spermatic cord, 64 percent of which were benign. This is in marked contrast to the high degree of malignancy associated with testicular tumors per se. All were predominantly mesodermal in origin with lipomata, fibromata, and mixed tumors making up the majority. His findings substantiated the review of Patel and Chalier. No inciting or predisposing cause is known. These tumors arise from the various elements of the cord. The malignant tumors of the spermatic cord, like the fibroma of the cord, usually appear to originate at the junction of the epididymis at a point where the various elements of the cord are united by connective tissue. Clinically the tumors are usually slow-growing and painless. Frequently, they have been mistaken for hernias, cysts, or hydroceles. The diagnosis is usually relatively simple. Most of the growths are circumscribed and freely movable.

(1) First Army Area Medical Laboratory, New York, N. Y.
(2) U. S. Air Force Hospital, Mitchel Air Force Base, L. I., N. Y.
(3) Strong, G. H.: Lipomyxoma of spermatic cord; case report and review of literature. J. Urol. 48: 527-532, Nov. 1942.

The diagnosis of extratesticular tumor is based on palpation of a normal testis and epididymis apart from the mass. Transillumination is not a distinct aid inasmuch as the soft lipomata and especially the myxomatous tumors are readily translucent. In any case, surgical exploration is indicated. Malignant tumors of the spermatic cord have been almost without exception sarcomas or tumors with sarcomatous elements.

The most common types of malignant tumor are liposarcoma, fibrosarcoma, rhabdomyosarcoma, or chondrosarcoma *(4-14)*. Sarcomatous tumors are practically always found in the scrotum, very rarely in the inguinal canal. In some instances, at least, the neoplastic tumor appears to arise from previously existent fibromas or the fibromyomas.

Early diagnosis is of paramount importance because of the comparatively high proportion of malignant tumors of the cord. In all cases where there is doubt regarding the true nature of a tumor, exploratory operation and excision is indicated. The clinical course and efficacy of treatment of malignant tumors of the cord is difficult to judge from the literature. The results of treatment over a significant length of time are few and are similar to those reported in the treatment of teratoma of the testis. These tumors should, therefore, receive the same radical treatment accorded testicular tumors. The lymphatics of the cord, epididymis, and testicular tunics, like those of the testis, drain directly into the retroperitoneal lumbar lymph nodes along the aorta and vena cava. The malignant tumors metastasize as frequently by the vascular route as they do by the lymphatics. Only when there is involvement of the skin, a rare complication, is there secondary involvement of the inguinal nodes.

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(4) Hinman, F., and Gibson, T. E.: Tumors of epididymis, spermatic cord and testicular tunics. Arch. Surg. 8: 100-137 (pt. 1), Jan. 1924.

(5) MacKenzie, D. W.: Fibromyxosarcoma of spermatic cord; report of case and review of literature of cord tumors. Tr. Am. A. Genito-Urin. Surgeons 25: 89-98, 1932; also, Brit. J. Urol. 4: 307-316, Dec. 1932.

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(11) Bo, A. V.: Un caso di tumore primitivo del funicolo spermatico. Ateneo parmense 18: 368-375, 1947.

(12) Zide, H. A.: Tumors of spermatic cord; report of hemangioma. J. Urol. 50: 255-257, Aug. 1943.

(13) Schulte, W. G.: Tumors of spermatic cord. Rocky Mountain M. J. 39: 189-192, Mar. 1942.

(14) McCook, W. W.: Leiomyoma of spermatic cord; case report. Am. J. Surg. 56: 499-500, May 1942.

CASE REPORT

A 17-year-old boy was admitted to the U. S. Air Force Hospital, Mitchel Air Force Base, N. Y., on 1 July 1951. During the course of a routine physical examination in the out-patient clinic, he was found to have a hard mass in his scrotum. There were no symptoms referrable to this mass. He could recall no trauma except being kicked in the scrotum on several occasions while playing football in high school. He felt well, and had been gaining weight.

On admission, the physical examination was negative except for the scrotal mass. This was ovoid measuring 4 cm. in its longest axis, and had a smooth surface and a firm consistency. No tenderness was elicited by pressure on the mass. It was entirely separate from the right testis and was so freely movable that it could be rotated almost completely around the testis. Roentgenograms of the chest and pelvis were negative for metastases.

On 2 July 1951, under pontocaine spinal anesthesia, the right scrotal contents were exposed through a high scrotal incision. The cord was isolated and 2 rubber-shod clamps were placed across it. A firm, well-circumscribed oval mass, measuring 4 by 2.5 by 2 cm. was found firmly adherent to the epididymis and could not be freed from it. The mass was opened and found to consist of pearly-white homogeneous, striated tissue. It was believed that the mass was neoplastic in nature. For this reason the incision was extended into the inguinal area, the cord was freed and pulled down and cut at its most distal portion, well within the inguinal canal. The tumor mass, the cord structures,

Figure 1. Photograph showing the extratesticular relationship of the tumor mass and its position in the spermatic cord.

the epididymis, and the right testis were then removed en masse (fig. 1). No evidence of local extension or of inguinal lymphadenopathy was found.

Postoperatively, the patient did extremely well and his convalescence was uneventful. On return visits to the out-patient clinic, he had no complaints, and felt perfectly well. The surgical wound had healed per primum and there was no evidence of local recurrence or of inguinal lymphadenopathy. The patient is to be followed for evidence of recurrence or metastasis.

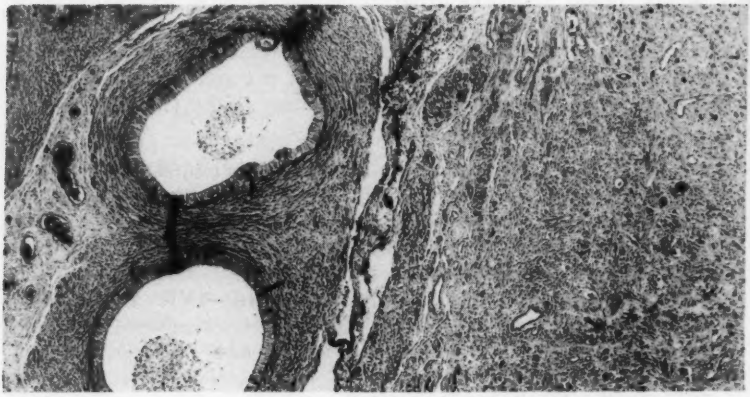

Figure 2. Low-power magnification of tumor which shows a blending of the striated muscle bundles into the tumor. The adjacent tubules of the epididymis are uninvolved.

Pathologist's report. No abnormality was noted in the testis or epididymis. The first portion of the spermatic cord was distorted by an egg-shaped mass of light-colored, dense, glistening tissue which was 4 cm. long and 2 cm. wide. On sectioning, it was homogeneous, dense, and had the consistency of soft cartilage. Distal to the tumor mass the cord was uninvolved. Neither lymph nodes nor masses were palpated along the spermatic cord or the spermatic vessels.

Microscopically, the tumor was characterized by a dense proliferation of cells (figs. 2, 3). The cells varied a great deal in size, shape, and appearance. There was interlacing and overlapping of cells. Most of the cells were long and spindle-shaped with rather oval to elongated nuclei. Many of the cells had nuclei which were large, bizarre-shaped, and, in some instances had multilobated nuclei. Large, round, hyalinized centers were present in some of the cells, and in other cells, the nucleus was pushed off to one side of a very pink-staining cytoplasm. An occasional dark hyperchromatic nucleus was present, as was also an occasional mitotic figure. The lesion showed slight vascularity. In some of the large cells with large irregular atypical nuclei, the cytoplasm streamed to both sides of the nucleus. Cross

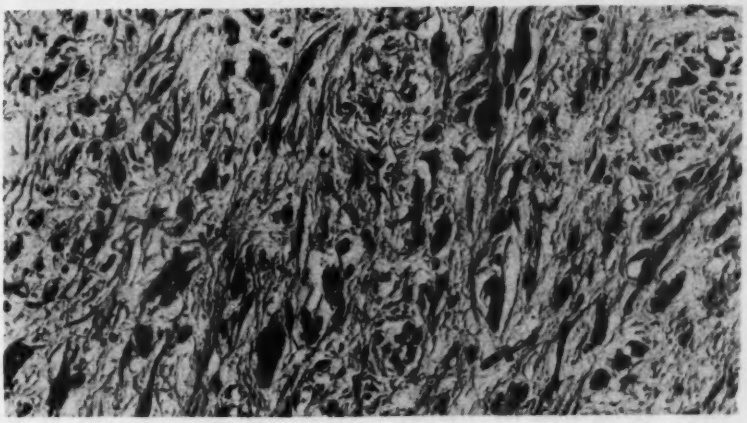

Figure 3. Medium high-power magnification showing the general cellular pattern of the tumor. Large irregular nuclei are prominent.

striations were apparent in these cells (fig. 4). The slides were submitted to the Armed Forces Institute of Pathology and a concurring diagnosis of rhabdomyosarcoma was returned.

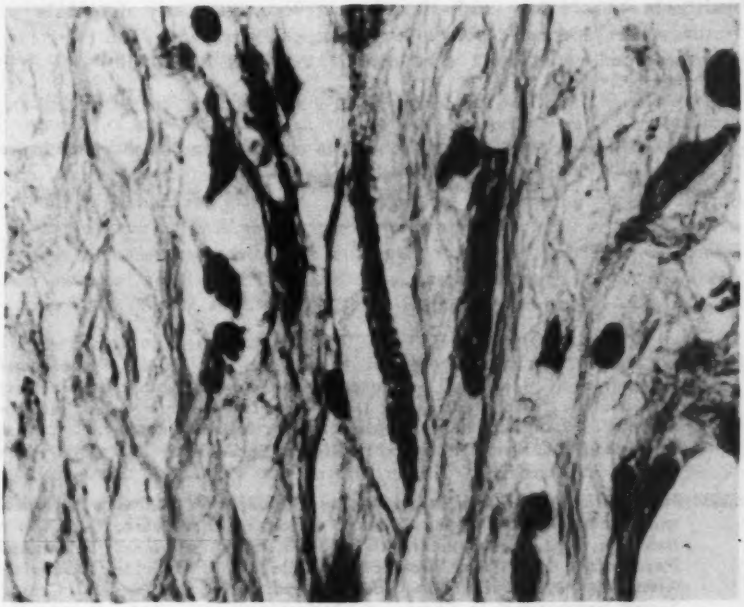

Figure 4. High magnification showing cross striations in a tumor cell. The irregular long abnormal nucleus shown is a frequent type.

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DISCUSSION

In all mixed tumors of the cord, it is necessary to study many sections of the tumor mass. The malignant character of a number of reported cases was not apparent on first examination *(15-17)*. In the reported case, it was impossible to identify epithelial structures or cell groups which would establish a diagnosis of teratoma. The fact that the Ascheim-Zondek test (which is positive in some patients with testicular tumors such as chorioepithelioma, teratocarcinoma, embryonal carcinoma, and some with seminoma) was negative is also a point in favor of a rhabdomyosarcoma. Striated muscle showing malignant changes in tumors of this type is uncommon as illustrated by the scarcity of reports of rhabdomyosarcoma of the cord. In most cases of rhabdomyosarcoma, other elements have been found. In our case, in view of the gross appearance of the tumor and the inability to identify histologically any other tissue elements in addition to those arising from the muscle, it seems most probable, that we are dealing with a primary extratesticular rhabdomyosarcoma of the spermatic cord.

SUMMARY

Involvement of the spermatic cord by neoplasm is an uncommon but not rare occurrence. About 64 percent of the tumors are benign. The malignant tumors are predominantly sarcomatous. Early diagnosis of tumors of the spermatic cord is of the utmost importance, and the treatment afforded such tumors is necessarily complete excision.

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(16) Prince, C. L.: Malignant tumors of spermatic cord; brief review with presentation of case of angio-endothelioma. J. Urol. 47: 793-799, June 1942.

(17) Prince, C. L.: Rhabdomyosarcoma of testicle. J. Urol. 48: 187-195, Aug. 1942.

BOOKS RECEIVED

Cellular Changes With Age, by *Warren Andrew,* Ph. D., M. D., Professor of Anatomy and Chairman of Department, The George Washington University School of Medicine, Washington, D. C. American Lecture Series Publication No. 127, A Monograph in American Lectures in Anatomy. 74 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.50.

Child Psychiatric Techniques, Diagnostic and Therapeutic Approach to Normal and Abnormal Development Through Patterned, Expressive, and Group Behavior, by *Lauretta Bender,* B. S., M. A., M. D., Professor of Clinical Psychiatry, New York University College of Medicine; Associate Attending Psychiatrist, New York University Bellevue Medical Center; Senior Psychiatrist in Charge of Children's Service of the Psychiatric Division, Bellevue Hospital, New York, N. Y. 335 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $8.50.

The Role of Physical Medicine in the Management of the Upper Extremity Amputee

Raoul C. Psaki, *Lieutenant Colonel, MC, U. S. A.* (1)

Anielio F. Mastellone, *Lieutenant Colonel, MC, U. S. A.* (2)

THE rehabilitation of the upper extremity amputee is a 5-point program. Each phase in the process of rehabilitation is equally important to its ultimate success. The program, as outlined by Kessler (3), includes (1) the psychologic preparation of the patient, (2) an operation to provide a stump which will permit the patient to wear a satisfactory prosthesis without pain and with comfort and utility, (3) the after care of the stump, (4) the selection of a prosthesis, and (5) the training of the amputee in the use of this prosthesis.

The psychologic preparation of the patient is vital to the ultimate success of the program and should be the responsibility of all concerned with the management of the patient. The orthopedist evaluates the patient's surgical needs and provides an adequate stump. The physiatrist is concerned primarily with the pre- and post-prosthetic training of the amputee. This phase of the program is extremely important because the amputee must be encouraged to use the prosthesis and obtain the maximal functional benefit from it, particularly in bimanual activities. This aspect of the problem will be considered in some detail.

The loss of an upper extremity produces a change in the patient's center of gravity and may produce defects of postural alinement, contractures, and muscular imbalance which will compromise the optimal functional result. Physical measures designed to prevent and correct these deformities should be instituted as early as possible. When physical therapy is started the patient should be indoctrinated in the importance of postural exercises. The definitive preprosthetic measures

(1) Letterman Army Hospital, San Francisco, Calif.

(2) Walter Reed Army Hospital, Washington, D. C.

(3) Kessler, H. H.: Rehabilitation of arm amputee. Plast. & Reconstruct. Surg. 2: 1-9, Jan. 1947.

are determined by an evaluation of the patient with respect to: (1) postural alinement, (2) joint mobility, (3) muscular strength, (4) the presence of pain, and (5) the condition of the stump.

The treatment program consists of general measures such as mat exercises designed to overcome deconditioning, postural defects, and muscular atrophy and weakness; and specific measures such as the judicious use of heat, massage, proper bandaging of the stump, and therapeutic exercise to the involved extremity. Adequate mobility of the proximal segments of the extremity must be assured in order that the greatest functional use of the prosthesis may be obtained. Thus the mobility of the scapulas is of prime importance, particularly in patients who will be fitted with the shoulder-harness type of appliance. The degree of ultimate usefulness of the prosthesis depends on the active mobility of the shoulder girdle.

The integrity of the glenohumeral joint with its capsule, ligaments, and muscles is important because these structures must hold the head of the humerus in the glenoid cavity and support the weight of the prosthesis. Thus the mobility, strength, and power of the rotator muscles intimately associated with the ultimate use of the prosthesis must be promoted as soon as practicable and, consequently, active exercises to the shoulder girdles must be initiated early and followed as soon as possible by resistive exercises to it and the glenohumeral joint on the involved side. Although the rehabilitation of the below-elbow amputee does not present as formidable a problem as that of the above-elbow amputee, the shoulder girdle and glenohumeral joint are equally important in both.

Exercises should be prescribed that will produce not only maximal active flexion and extension of the elbow, but also as full and complete pronation and supination as possible. An analysis of the arm and hand has revealed that it must be able to perform two divergent and opposite functions with equal dexterity if the amputee is to be completely rehabilitated *(4)*.

These functions are the activities of daily living and the demands of industry. The former require bringing the extremity and hand toward the body in such activities as personal hygiene, dressing, and eating whereas the latter involve actions which cause the extremity to move away from the body. Consequently, early exercise to preserve the flexibility of the elbow and pronation and supination of the forearm are within the province of the rehabilitation program for the upper extremity amputee.

One of the major advances in the rehabilitation of the below-elbow amputee has been the development of kineplasty which consists of the surgical tunneling of the disinserted biceps muscle and its use as the

(4) Reilly, G. V.: Preprosthetic exercises for upper extremity amputees, with special reference to cineplasty. Phys. Therapy Rev. 31: 183-188, May 1951.

motor for the operation of the terminal device of the prosthesis. In addition to eliminating the shoulder harness it also restores a degree of proprioception which gives a semblance of life to the prosthesis. If kineplasty is contemplated, specific exercises to produce hypertrophy of the biceps are indicated. The early postoperative care of the tunnel is carried out by the surgeon and includes gradual mobilization of the muscle and insertion of the biceps pin. When satisfactory healing has occurred, an exerciser is attached to the biceps pin and the patient is instructed to produce maximal contractions of the biceps several times a day, gradually increasing the number of repetitions. Length-tension studies have demonstrated that strength and the applied power are directly related to the excursion of the muscle.

When the amputee has been fitted with a prosthesis his treatment is centered in the occupational therapy section where he is taught how to use the prosthesis. This is a slow, tedious process with the necessity for encouragement. Gradually the patient is taught the activities of daily living and the use of devices and apparatus that he will use daily. These tasks are broken down into simple steps and graduated into more difficult maneuvers which are learned singly and then combined until dexterity and skill result. During this final phase of training, the psycologic approach should constantly be stressed because the amputee fails to realize that his own slow progress is the result of limitations inherent in all prostheses. If constant encouragement is not given at this stage the patient will attempt to attribute his own shortcomings to the prosthesis that he is wearing and will soon discard it.

BOOK REVIEWS

Disorders of the Heart and Circulation, edited by *Robert L. Levy,* M. D., Professor of Clinical Medicine, College of Physicians and Surgeons, Columbia University; Attending Physician, Presbyterian Hospital, New York. 944 pages; illustrated. Thomas Nelson & Sons, New York, N. Y., publisher, 1951. Price $12.

This book brings together, under one cover, 34 monographs on cardiovascular subjects by 41 outstanding medical authors, with little overlapping and omission, so as to cover comprehensively the field of cardiovascular diseases. The material represents chapters originally prepared for Nelson's Loose-Leaf Medicine, now revised and published as a separate book. The data presented is illustrated profusely with tables, diagrams, and photographs. Among the many features of interest is the classic monograph on congenital heart disease by Maude E. Abbott, which is brought into current focus in the succeeding chapter by Richard J. Bing. A large amount of data originally published in several journals is consoldiated by Edward F. Bland in his chapter on

rheumatic heart disease. Congestive heart failure is presented by Tinsley Harrison; electrocardiography by Ashton Graybill; and roentgenology of the cardiovascular system by Merrill C. Sosman. Traumatic heart disease receives thorough coverage consistent with its increasing importance in the chapter by R. W. Kissane. The other chapters are similarly authoritative.

Throughout the book, the modern technics of cardiac catheterization, angiocardiography, oximetry, and tests of pulmonary function find their proper place in supplementing previous diagnostic methods. The role of surgery in the treatment of cardiovascular disease is emphasized by the inclusion of chapters on surgical therapy of congenital defects, hypertensive vascular disease, angina pectoris, and arteriovenous aneurysm. Each chapter includes a moderate number of references to both classic and modern literature. An adequate index is provided. This volume will prove of interest and value to the cardiologist and the internist.

—*Col. B. E. Pollock, MC, U. S. A.*

Interpersonal Relations in Nursing, A Conceptual Frame of Reference for Psychodynamic Nursing, by *Hildegard E. Peplau,* R. N., B. A., M. A., Instructor in Nursing Education, Teachers College, Columbia University. Foreword by *R. Louise McManus,* Ph. D., Director Division of Nursing Education, Teachers College, Columbia University. 330 pages; illustrated. G. P. Putnam's Sons, New York, N. Y., publisher, 1952. Price $5.

This is a book for instructors, general duty nurses, charge nurses, chief nurses, and administrators who provide conditions under which nursing services are improved. It is divided into four parts with a selected bibliography. Part I is Phases and Roles in Nursing Situations; Part II, Influences in Nursing Situations; Part III, Psychological Tasks; and Part IV, Methods for Studying Nursing as an Interpersonal Process. The introduction to each part states its specific purpose and every chapter begins with a summary of what is to follow and ends with a review of what has been covered. The author has identified some of the concepts and principles that underlie interpersonal relations and change nursing situations into learning experiences. There are graphic presentations to aid the reader in understanding the points stressed.

Two guiding assumptions underlie the whole work: (1) "* * * the kind of person each nurse becomes makes a substantial difference in what each patient will learn as he is nursed throughout his experience with illness," and (2) "* * * fostering personality development in the direction of maturity is a function of nursing and nursing education; it requires the use of principles and methods that permit and guide the process of grappling with everyday interpersonal problems or difficulties." This book should be useful to nurses in the military service and it may serve as a guide in answering many of the specific nursing problems met in military as well as civilian nursing.

—*Capt. E. Welch, U. S. A. F. (AFNC)*

The Role of Psychiatry in Naval Retraining[1]

John M. Murphy, *Commander, MC, U. S. N.*

J. Douglas Grant (2)

THE Navy has long prided itself on its efforts to build men. Retraining is increasingly being viewed as an intensive aspect of the Navy's general character-building program. In keeping with advanced thinking in the fields of psychiatry and penology, the Navy has recognized the fact that many of its disciplinary offenders are persons who are having adjustment difficulties on the basis of personality and emotional disturbances. In former years such offenders were disposed of according to the penal or punitive concept which held that punishment in itself was corrective. Experience has taught the fallacy of this concept. Punishment alone, without recognition of underlying emotional problems and efforts toward constructive rehabilitation, is futile and more often than not intensifies the emotional maladjustment.

The Naval Retraining Program was established in 1943 in the belief that, by means of an integrated program of re-education and social and personal reorientation, many disciplinary offenders could be salvaged for useful service. The soundness of this idea has since been demonstrated. Of 4,809 Navy, Marine, and Coast Guard personnel confined at this retraining command, between September 1946 and July 1951, 2,831 or 59 percent were restored to active duty. These men would otherwise have been released to civil life with the additional handicap of a bad conduct or a dishonorable discharge. Follow-up studies, although admittedly inadequate, nevertheless indicate that a large percent of these men successfully completed their enlistments and gave evidence of being better adjusted persons.

The objectives of naval retraining have been twofold. The program was established primarily to serve the Navy and the retrainee by helping him make the personality adjustments which are the prerequisites for honorable service in the Navy. It has always been recognized,

(1) U. S. Naval Retraining Command, Mare Island, Calif.
(2) Clinical psychologist.

however, that some retrainees will be unable to make the necessary changes and that they will be returned to civil life. In such cases every effort is made to encourage acceptance of civic responsibility so that, following discharge from the service, the retrainee will function as a more useful member of society.

From the outset, the Naval Retraining Program has been flexible and experimental. At this retraining command, new methods and technics are constantly studied and, if found to be of value, are adopted or modified to the needs of the program. In frequent staff conferences discussion of new ideas and differing viewpoints is encouraged. Close liaison with various other correctional institutions in California is maintained, with field trips and an open exchange of information and ideas. Every effort is made to integrate and correlate the work of the several departments toward the ultimate objective of more effective retraining.

The psychiatric unit has played a major role in this work. It is our belief that effective retraining is fostered by an institutional atmosphere which encourages the individual's growth toward maturity. While all categories and degrees of severity of mental aberration are encountered, in a broad sense, most offenders have been found to be persons who have had difficulty facing the responsibilities and demands of mature relationships.

One retrainee was found to be still struggling with his feelings concerning a neglecting father. He left home hating his father. Never having resolved his hatred with his real parent, he had a deep hostility for every authority-figure with which he was forced to relate. Every officer, chief, or older shipmate was viewed with suspicion and hatred. Another was struggling with immature jealousy feelings concerning a younger brother who showed more talent and received more attention in the home. This man was very sensitive to competition. All activity with his shipmates was seen as a test of his powers and beneath this was a fear that he would fail the test. Still another was struggling with a dependence-independence conflict. He had joined the Navy to escape his dependent feelings toward his parents, but away from his parents he missed the dependence which he could not accept. He was homesick and resentful of the Navy which was forcing him to be a man when only part of him felt grown-up.

So it goes. Each retrainee is different. Each has his specific problems and feelings, but all demonstrate in their particular way the characteristics of an immature personality unable to accept the mature responsibilities of military life. How to help these men grow up is the task of the retraining program. The command must help the retrainee discover, face, and outgrow his own disabling fears and feelings which have made adequate living so hard, if not impossible, for him.

From the moment a man arrives at the retraining command, every effort is made to foster his personal growth and maturity. He is received

in an understanding atmosphere where his difficulties with interpersonal relationships and rules are accepted. The rules of the command are as simple and few as possible. Existing rules, however, are definite and firmly establish the boundaries within which the retrainee must make his new efforts at self-understanding and adjustment. By means of orientation films, lectures, and discussions, the philosophy and attitude of the command are presented to the new retrainee. He is faced squarely, yet patiently and understandingly, with the question: What do you want to do with the present situation to better prepare yourself for life in or out of the service? Efforts are made, particularly through social and personal orientation discussions, to reduce the initial emotional feelings of hostility, depression, or anxiety. The task is to free the man as quickly as possible of his handicapping feelings and attitudes so that he can begin to use self-directing energy in planning a productive program for himself.

A careful social history and occupational interview is conducted with each retrainee. The atmosphere of this relationship is that of 2 men, the retrainee and his interviewer, looking at the retrainee together in an effort to evaluate his assets and liabilities as a foundation for the personal growth to be fostered by the command. Psychologic and educational tests are administered and the results discussed with each man. In the initial psychiatric interview a comprehensive evaluation of the personality factors to be considered and estimates of the probable restoration potential are made. At the time of this assessment, the retrainee is assigned to a counselor or is scheduled for a more extensive therapeutic program.

Psychotherapy involves a continued individual relationship with either the psychiatrist or psychologist as well as possible group therapy. When indicated, a retrainee may be admitted to the dispensary for more direct observation and intensive psychotherapy. Occasionally, a man is found to be so disturbed as to warrant transfer to the neuropsychiatric ward of the nearby naval hospital. Most of the men are assigned to a personal counselor who, as a volunteer member of the duty staff, represents an understanding authority-figure. Each man is seen by his counselor at least once a week, individually and/or in groups, to discuss his feelings, plans, and problems.

Duty, school, and avocational assignments also are made with consideration of the retrainee's efforts toward self-development. Training courses in marine and naval duties are offered. Special on-the-job training and various athletic and hobby programs are provided. In addition, a well-developed adult education program is offered in the evenings and sponsored by the Vallejo School System (*3*, *4*). The retrainee's assignments and plans are reviewed periodically

(*3*) A remedial program is a special feature of the adult education services.

(*4*) Carey, R. W.: Elementary training. Naval Training Bulletin, NavPers 14905. pp. 15-17, Sept. 1951.

by a special board of officers. Also, each man is again interviewed by the psychiatrist prior to Clemency Board action. At this time his response to retraining is reviewed and his restoration potential is re-evaluated. Psychiatric opinion plays an important role in Clemency Board action, when a final recommendation is made to the Secretary of the Navy concerning the disposition of each man. Every effort is made, however, to keep the psychiatric phase of the program an integrating aspect of the entire command atmosphere. This influence is fostered through weekly counselor discussions and close liaison with the chaplain, Red Cross representative, and education and administrative personnel.

Although many improvements must come through further experience and research, retraining is a challenging social and psychiatric experiment of which the Navy can justly be proud.

BOOKS RECEIVED

Plastic Surgery, An Introduction for Nurses, by *C. R. McLaughlin,* M. B., Ch. B., B. Chir., F. R. C. S. E., Consultant in Plastic Surgery, Queen Victoria Hospital, East Grinstead, with special sections by other *members of the Queen Victoria Hospital Staff,* and illustrations by *R. H. Dale,* M. A., M. B., B. Chir., F. R. C. S. E., Senior Registrar in Plastic Surgery. Foreword by *Sir Archibald H. McIndoe,* C. B. E., M. S., M. Sc., F. R. C. S., F. A. C. S. 125 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $3.

Principles and Practice of Aviation Medicine, by *Harry G. Armstrong,* M. D., F. A. C. P., The Surgeon General, United States Air Force. 3d edition. 476 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1952. Price $7.50.

Brain Tumors of Childhood, by *Henry M. Cuneo,* M. D., Assistant Clinical Professor of Neurological Surgery, University of Southern California School of Medicine, Los Angeles, Calif., and *Carl W. Rand,* M. D., Clinical Professor of Neurological Surgery, University of California School of Medicine, Los Angeles, Calif. American Lecture Series Publication No. 104, A Monograph in American Lectures in Surgery. 224 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $5.75.

The Auricular Arrhythmias, by *Myron Prinzmetal,* M. D., *Eliot Corday,* M. D., *Isidor C. Brill,* M. D., *Robert W. Oblath,* M. D., *H. E. Kruger,* and Associate Authors, *Joshua Fields,* M. D., *Walter Flieg,* M. D., *Alfred Goldman,* M. D., *Harold Karpman,* A. B., *S. Rexford Kennamer,* M. D., *John A. Osborne,* M. D., *Alvin L. Sellers,* M. D., and *L. Allen Smith,* M. D. 387 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $16.50.

Calculation of Industrial Disabilities of the Extremities, by *Carl O. Rice,* M. D., M. S., Ph. D., F. A. C. S., Clinical Associate Professor of Surgery, University of Minnesota Medical School; Surgical Staff, St. Barnabas Hospital, Minneapolis, Minn. Drawings by *Jean E. Hirsch.* 284 pages; 204 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1952.

Psychologic Aspects of Surgery[1]

Albert J. Glass, *Colonel, MC, U. S. A.* [2]

Frank E. Hagman, *Colonel, MC, U. S. A.* [2]

THE skill and effectiveness of the surgeon has steadily increased during our modern era. Aided and stimulated by discoveries in physiology, anesthesia, and antibiotic drugs, the scope of present-day surgery has greatly expanded. The surgeon has been enabled to operate freely in anatomic regions previously forbidden and to perform what seemed to be surgical miracles only a few years ago. Because he uses a direct and dramatic approach to the elimination of disease, his beneficial results are almost immediate and can be promptly appreciated by his patients. It is not surprising, therefore, that surgical training centers are stormed by eager young medical school graduates who long to possess this marvelous surgical ability so that they, too, can achieve a degree of omnipotence ordinarily denied to most mortals.

As in all worthwhile attainments, however, the road to surgical success is strewn with many obstacles. One must first be accepted by an adequate training institution that can provide both the clinical material and the preceptors vital to the transmission of the principles and technics of modern surgery. Then there is a long period of unremitting toil and devotion to study and work in order to acquire the necessary skill. Even this is not sufficient, unless the potential surgeon possesses the type of personality that can develop confidence and even boldness when necessary to tide him over the sickening and inhibitory feelings of anxiety which inevitably occur in the vicissitudes and complications of difficult surgical procedures. There is yet another faculty which must be acquired by the surgeon lest he become only a technical expert with the scalpel. This is surgical judgment: a combination of knowledge and insight, which when possessed by the surgeon makes him a complete artist in his specialty. Surgical judgment is admittedly difficult to acquire. A wide experience with many and varied types of surgical pa-

[1] From the Surgeon's Circular Letter, General Headquarters, Far East Command, Sept. 1951.

[2] Medical Section, General Headquarters, Far East Command.

tients is necessary. There is, however, another and perhaps less understood component of surgical judgment. This relates to the ability of the surgeon to consider conscientiously the ultimate total function and welfare of the patient in whom an operation is contemplated.

At the outset it should be made clear that such a concept of the functioning of a total person involves abstract thinking. This is an ability, possessed by all to a varying degree, which enables us to conceive mentally of an idea, theory, or concept which is not a direct product of the ordinary senses, but synthesized by the highest of our mental faculties. In contrast to this type of thought is concrete thinking where only the evidences afforded by the usual sensory receptors are considered. In patients with brain damage or severe psychologic disorders, abstract thinking becomes impaired and regresses to the concrete type which is a characteristic feature of cerebral incapacity.

The abstract concept of what one hopes to accomplish by a surgical operation is far more important than the concrete and actual technical performance. To this end, 3 surgical principles have become axiomatic. The *first* dictates that whatever operation one chooses to perform, primary consideration must be given to insuring that a live patient results. This does not mean that risks should not be taken but warns that a brilliant technical success alone is of no value. The *second* rule of surgery insists on the basic goal of attempting to remove or alleviate the disease from which the patient suffers. The *third,* and perhaps the most difficult principle to maintain, concerns the admonition to the surgeon that his operation not aggravate the patient's condition or leave him with another disease. The foregoing rules do not militate against the calculated risks which must be assumed by the surgeon, but should be considered as guideposts in his abstract thinking in order that the main object or goal of his skill can be more readily visualized and that he be not deluded by wishful thinking or overwhelmed by admiration of his surgical prowess.

The third rule of surgery, which warns against damage to the patient generated by the surgeon himself, is the zone of consideration where the concept of the total person plays its largest role. It is here that one must consider the entire physical body rather than a locally diseased part and, even more important, it is here that the psychologic as well as the somatic aspects of the patient can be seriously injured. From this standpoint operations can be roughly divided into the following categories:

1. *Emergency operations.* There is no doubt concerning the necessity of operation. The patient is certain to die very soon unless something is done at once. Time is of the essence. No consideration can be given to any other factor than immediate operation to achieve the first rule of surgery, i. e., a live patient, regardless of consequences. In such instances the surgeon will perform a tracheotomy with a crude knife, heedless of possible infection, or reach in with unwashed hands to stem

serious arterial bleeding, or decompress tension pneumothorax by any means at hand, or rapidly open the chest and massage the heart in cardiac arrest.

2. *Urgent operations.* Speed is not so essential but the lesion demands prompt surgical intervention to ward off a catastrophe. Operation is urgent in patients with ruptured spleen, strangulated hernia, gangrenous appendicitis, volvulus of the colon, or epidural bleeding.

3. *Necessary operations.* There is even less urgency but the lesion is definite, chronic, and a direct cause of the patient's symptoms. The connection between the lesion and the symptoms makes it fairly certain that operation offers an excellent opportunity for relief or improvement. Such cases are patients with gallstones with intermittent common bile duct obstruction, chronic lung abscess, large ovarian cyst, carcinoma of the rectum, or meningioma with neurologic manifestations.

4. *Elective operations.* Definite evidence of pathology is present but it is not at all certain that the symptoms will be removed by operation. Such cases are patients with deviated nasal septum, chronic tonsillitis, protrusion of an intervertebral disk, or retrodisplacement of the uterus.

5. *Doubtful operations.* This comprises operations for dubious indications in which the ultimate results are at best unpredictable. Varicocele is an example of this category. Pain in the groin and scrotum with radiation to the thigh in a neurotic young man with a small varicocele is an extremely doubtful indication for varicocelectomy. The results are often disappointing and indeed iatrogenic trauma frequently is engrafted on the symptom complex. In the absence of demonstrable evidence of ureteral obstruction, it is doubtful that operation for nephroptosis will help the patient. From the military viewpoint, doubtful operation includes procedures for the correction of long-standing skeletal deformities present in recent inductees. Many operations have been performed for the correction of such deformities in the past. Despite anatomic improvement, many of these patients must be separated from the military service through medical channels.

6. *Wishful operations.* There is no objective evidence of disease but the patient's symptoms seemingly demand an attempt by the surgeon to do something. The surgeon is motivated to activity (1) on a hunch, (2) because of pressure by the patient or the patient's family, or (3) because his own intolerance of inactivity cannot be withstood. It is in this group that explorations to find out what might be causing abdominal symptoms are common. Repeated amputations for "phantom limb" and application of casts to correct camptocormia or to cure backache are also undertaken.

Although others may devise a more accurate classification of the indications for surgical intervention, this one illustrates the mechanism of the abstract more or less intuitive thinking of the experienced surgeon. The need for considering the total personality of the patient increases

as the absolute necessity for surgery decreases. It is in the realm of elective, doubtful, or wishful indications that it becomes more and more difficult to maintain the third rule of surgery and thus prevent iatrogenic trauma, for here the personality of the patient assumes a more prominent role in the results of the operation and the surgeon must understand and use the concept of how the patient is going to function in a given environment. Failure to consider the total functioning of the patient may cause the surgeon to produce only a technical correction which may have either no effect on the capacity of the patient to work, or may cause a fixation of symptoms.

Everyone is aware of the complications inherent in operating on patients who are seeking compensation. Certain persons may be enabled by operation to solidify symptoms and thus consciously or unconsciously obtain a tangible benefit by a persistence of illness. This may occur even when the operation is urgent or necessary, to say nothing of elective, doubtful, or wishful. Even when compensation is not involved, some persons are prone to use illness as an escape from adult obligations with the added dubious but definite gains of childish helplessness. In such persons the surgical scar is the hallmark of respectability and the cornerstone of a secure defense against either their own insight or the critical evaluation by others for their failure to make a better adjustment. An extreme example is the woman who has endured the suffering of multiple but fruitless operations in order to gain the unhappy but vicarious pleasure of being an invalid who then can rule those about her by the power of chronic symptoms.

The errors of surgical judgment that can occur in civilian practice apply with even greater force in the military sphere. The hazards of combat and the deprivations of overseas life provide powerful incentives to use the honorable excuse of physical incapacity for practical goals unobtainable by any other method. It is important that the military surgeon be aware that operation is prima-facie evidence of a previous disabling disease. This can affect his results, particularly in patients undergoing elective or doubtful operations because they are especially vulnerable to iatrogenic fixations. In military life it is important that the surgeon think of the ultimate result of such surgical procedures. He must answer the question: Will the patient be able to perform duty as he did prior to the operation? Conservative nonoperative treatment may permit many patients to continue on duty with a chronic but nondisabling condition, such as an uncomplicated pilonidal cyst, whereas even a technically successful operation will prevent duty for a long time after which the soldier may no longer be motivated to resume his previous hardships and hazards. In this connection, the military surgeon must give primary consideration to the needs of the group rather than the desires of the individual.

Perhaps the largest obstacle to acquiring the faculty of good surgical judgment lies in the personality of the surgeon. The same character

traits of confidence and boldness which stand him in good stead during the trials and tension of a difficult operation may also contribute to an omnipotent attitude toward his opinions. The indications or decisions as to a surgical procedure, however, require more abstract thought and less concrete conclusions. The emotional attitude of superiority and omnipotence may readily defeat good surgical judgment as it tends to force the surgeon to adhere to his diagnoses and recommendations despite evidence of their error and the judgment of others. The wish to be infallible militates against the concept of how the operation will affect the later functioning of the patient. This pitfall is avoided as the surgeon comes to have a genuine confidence in his ability. It is then no longer necessary to maintain an attitude of omnipotence as a defense against inexperience and inner feelings of doubt. The more experienced surgeon tends to have better surgical judgment, in part because he has arrived, so to speak, and no longer has to prove himself. He can relax and use his available extra energy for abstract thinking about the patient rather than for compulsive action resulting from an inner emotional need to do something.

The possession by the surgeon of undue confidence and boldness may also contribute to an omnipotent attitude toward his ability to undertake almost any operation, heedless of his personal limitations and the inadequacies of auxiliary support so vital for successful surgery. Thus he may wantonly enter on a course of action demanding skill and aid not possessed by him, to the end that the welfare of the patient is placed in unnecessary jeopardy. Surgical judgment includes the examination of one's inner resources and the environment to determine whether or not a given surgical problem should be treated by him or better referred to a surgeon more experienced and more technically qualified and in a more favorable setting.

One other facet of surgical judgment in military life relates to the evacuation policy of an overseas theater. It is generally agreed that such a policy is necessary. In the Far East Command, experience has demonstrated that usually it is wise to return patients to the United States when it is likely that they cannot be returned to duty within a period of 120 days. It becomes a matter of surgical judgment, therefore, to reach a decision concerning the likelihood of returning the patient to duty within this period prior to embarking on an elective operation. It is in general good surgical judgment not to operate in overseas hospitals on a patient with (1) an internal derangement of the knee joint, (2) an intervertebral disk lesion, (3) a skeletal deformity existing prior to induction into the service, (4) a malignant neoplasm in the absence of complications demanding prompt intervention, (5) a need for major plastic repair, (6) chronic osteomyelitis, (7) tuberculosis, or (8) a peptic ulcer not responding to medical treatment and without complications demanding prompt intervention.

A paramount function of the medical services is to conserve the efficiency and effectiveness of the Armed Forces by all the technics of the art and science of medicine. The morale of our fighting men is closely related to the welfare of their dependents. Clearly, when a wife or a child is stricken by illness the soldier husband or father cannot function as he should until relieved of his anxiety. It thus becomes the privilege and responsibility of the surgeon to do his utmost on behalf of the soldier and his dependents. The concepts of surgical judgment which have been discussed apply equally to the surgical care of dependents with one notable difference. It is not important to consider the limiting factor of return to duty in a specified time.

BOOK REVIEW

Pathology of the Fetus and the Newborn, by *Edith L. Potter*, M. D., Ph. D., Associate Professor of Pathology, Department of Obstetrics and Gynecology, The University of Chicago; Pathologist, The Chicago Lying-in Hospital; Chief Pathologist, Chicago Department of Health. 574 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $19.

Dr. Potter has expended a tremendous amount of effort in compiling this text on a heretofore relatively neglected subject. Her treatise takes the reader through the gamut of developmental anomalies of every organ system of the fetus and newborn. Particularly does she stress the clinical aspect of the disease entity wherever applicable. Abortion, prematurity, anoxia, birth trauma, infections, malformations, and tumors are discussed, emphasis being given to the clinical aspects of each. The discussions dealing with the pathology of the lung, congenital heart disease, bone disease, and the adrenal glands are practically monographs. This was obviously done in the hope that when symptoms can be recognized as associated with specific pathologic processes a great stride will then be made toward their possible prevention and cure. There is a tremendous store of practical and valuable information taken from over 6,000 autopsies at the Chicago Lying-in Hospital; 3,000 autopsies performed by pathologists of the Chicago Department of Health; a review of 10,000 protocols from autopsy material taken in other Chicago hospitals, and a total of about 50,000 deliveries at the Chicago Lying-in Hospital. The illustrations are mainly from Dr. Potter's collection. This work will be valuable as a reference text. Dr. Potter has aptly stated, "Only if this work ultimately helps save the lives of infants who otherwise might die will it have been worth the effort expended in its production." She has thereby taken the subject of pathology of the fetus and the newborn and placed it in the laps of the clinicians.—*Lt. Col. H. L. Riva, MC, U. S. A.*

Problems of Insect Control

Joseph E. Webb, Jr., *Lieutenant Colonel, MSC, U. S. A.*

INSECT-CONTROL measures during the early months of the occupation in Japan involved large-scale use of aircraft for the dispersal of insecticides. Preinvasion and postinvasion applications of DDT by air in the Philippines, Marianas, and Ryukyus had been a military necessity. Troop commanders from these areas on entering Japan, in anticipation of epidemics of insect-borne diseases, and accustomed to relying heavily on aircraft spraying, used that method of control extensively. The need for protecting the health of troops at that time outweighed consideration of the possible damage to the Japanese economy by airplane dispersal of DDT. By the latter part of 1946 it became evident to American and Japanese scientists that continued large-scale applications of DDT by aircraft would incur extensive damage to the Japanese fish, silkworms, and beneficial insect life.

Early in the occupation it was realized that the mosquito-control problem in Japan necessitated intensive ground control rather than airplane spraying as the primary procedure. Most of the insecticide being applied by the airplanes was landing on rooftops, streets, and open, well-drained areas, while the breeding of mosquitoes and flies, in their usually well-protected habitats, continued unabated. In occupation units, screening and thorough residual spraying with DDT was of the utmost importance.

A sufficient number of malaria survey and control detachments remained with the occupying forces in Japan during late 1945 and most of 1946 to accomplish a ground-control program in buildings and posts used by occupation forces. By the spring of 1947 all except 2 malaria control detachments and 1 malaria survey detachment in Japan had been deactivated. Subsequent control measures were delegated primarily as a unit responsibility, but the extreme shortage of technically trained personnel resulted in an inadequate and ineffective program. Inspections revealed that few units had the necessary type of equipment, or personnel sufficiently familiar with the preparation and proper application of the various insecticides and rodenticides then in general use. Aerosol bombs were frequently being used and commonly misused, for every conceivable procedure in insect control. One person

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who reported being molested by mosquitoes during the night stated that he "had emptied the contents of 4 aerosol bombs at one time with good results." Occasional mosquitoes in barracks and homes often resulted in the instigation of airplane spraying, whereas the DDT residual treatment of the building interiors and proper screening would have been the more practical and economical solution.

Although some control of mosquitoes and flies in Japanese civilian areas was effected each season by Japanese sanitary teams under the supervision of Civil Affairs personnel, these measures were often far from adequate. Civilian areas adjacent to facilities used by occupation forces were a constant source of infestation. In metropolitan areas mosquito breeding was prevalent in drainage ditches, bombed-out buildings, receptacles in cemeteries, et cetera. In rural areas additional breeding places were rice paddies, irrigation ditches, night-soil storage tanks, et cetera. Night-soil receptacles teeming with fly larvas were a common sight in Japan. Artificial containers holding water to be used for watering gardens and for diluting the night-soil were sources of mosquito breeding throughout the summer. In some instances close cooperation between Army supervisory personnel and Civil Affairs Public Health officials resulted in a fairly effective program in areas adjacent to occupation facilities. A good example of this was the Yokohama area where extremely close liaison was maintained between officials of the Army, Civil Affairs, and the Japanese government. Observation of the operations of Japanese civilian sanitary teams in many areas and the common insanitary practices of the families and communities indicated that there was often little importance attached to the need to control such pests as mosquitoes, flies, and rats. Japanese agriculture has been and still is so dependent on night-soil storage pits and the pail latrine in the conservation and use of night soil, that fly and mosquito breeding cannot possibly be adequately controlled without individual action by each farmer.

In July 1946, directives were issued requiring that before any area was approved for airplane spraying, the probable effect of DDT on the natural resources of the area be evaluated, to include particularly the effect on silkworms, fish, and crops. If damage to those natural resources was likely to be appreciable, airplane spraying was prohibited.

In March 1947, at a time when many installation commanders, particularly those at Air Force Bases were still submitting many requests for approval to conduct airplane spraying of DDT, General Headquarters in Tokyo announced that, beginning with the fiscal year 1948, responsibilities for conducting insect and rodent control activities would be in accordance with TM 5-632, November 1945 (Insect and Rodent Control). This directive made the Corps of Engineers responsible for effecting control measures. Early in July 1948 an entomologist was assigned to the Eighth Army Engineers to supervise the organization of insect and rodent control procedures as an engineering

function. In April 1947 I had been assigned as entomologist for the Medical Section, Headquarters Eighth Army. The other entomologist and I, operating as a team, began to organize and develop an insect and rodent control program, conducted by regional post engineers, to protect the health and moral of Eighth Army forces. We advised a minimum of airplane spraying. Unfortunately, the developmental phase of this program had to take place during the summer months when an efficient operating program should have been in operation. Obstacles to the engineering program during the first months of the fiscal year 1948 included lack of preventive medicine personnel to supervise the program, lack of distribution of new and appropriate types of spraying and dusting equipment, difficulty in obtaining supplies, and lack of trained enlisted and Japanese supervisors. In the 2 succeeding years, some of these obstacles were partially or wholly surmounted.

TABLE 1. *Attendance at training courses*

When given	Number of sessions	Total attendance
November 1947	1	37
April 1948	1	55
October 1948	2	63
April 1949	2	88
October 1949	2	124

Initially, the engineering program called for a technically trained civilian insect and rodent control supervisor on the staff of each regional post engineer, but the unavailability of qualified civilian personnel in Japan made it necessary to assign untrained enlisted men to these jobs. Because there were no Medical Service enlisted men trained in preventive medicine available to act as supervisors for this work, it was necessary to use untrained men from the Corps of Engineers.

Essential phases of program development have been the conducting of training courses for enlisted insect and rodent control supervisors and semiannual visits to all posts, hospitals, et cetera to give on-the-job training and assist in all technical aspects of the program. These 2 functions were carried out jointly by entomologists of the Engineer and Medical Sections of Eighth Army and General Headquarters. The 2 existing malaria control detachments were used to give technical direction to the engineering programs in Yokohama and Kobe Base. The one in Yokohama assisted in conducting the semiannual training courses there. The development of the program was reflected to some degree in the progressive increase in attendance at the training courses which were attended by the insect and rodent control supervisors from all posts and hospitals (table 1). Recent courses were also

attended by post medical inspectors. The instruction given in these courses included a maximum of practical demonstrations of post problems. It is planned to give this course to smaller groups so that the training will be more personalized and the demonstrations more effective.

A control team consisting of 1 enlisted man and several Japanese laborers was organized in each hospital as a part of the utilities section. These crews usually worked independently of the regional post engineer, but obtained necessary supplies and equipment from them. This arrangement resulted in an excellent program in all hospitals. The regular post engineer crews ordinarily consisted of from 1 to 4 enlisted men and from 5 to 50 Japanese laborers, depending on the size of the post and additional areas to be controlled.

Twenty-four regional post engineers were responsible for the insect and rodent control program, including requisitioning and distributing necessary vehicles, supplies, equipment, and personnel, for all Eighth Army units.The crews operating under the post engineer accomplished residual spraying, area larviciding, rat proofing, placing poison baits, and trapping rats in all buildings used by the occupation forces within a radius of several miles of the posts or headquarters. Many small units such as Civil Affairs teams, Counterintelligence Corps teams, Criminal Investigation Division teams, and rest hotels which were located in remote areas of Japan, frequently at great distances from the larger military units, had their own insect and rodent control teams. The regional post engineer having responsibility for these smaller units, furnished needed supplies and equipment and on-the-job training as needed to provide a properly functioning team. Many post engineers organized training courses to instruct personnel from these outlying units. Additional on-the-job instruction was provided by visits to those outlying units by an entomologist from corps or army headquarters.

A truck-mounted power fog- and dust-dispersing machine was used during the 1949 season in Yokohama as an effective supplement in area control of both mosquitoes and flies. This machine delivered a mist or dust cloud of DDT solutions at high velocity which drifted through poorly sanitated Japanese civilian areas as well as the military areas concerned. This procedure appreciably effected mosquito larval control and also greatly reduced adult populations of flies and mosquitoes. Additional units of this equipment were obtained by the engineers and were used in 1950 in several metropolitan areas of Japan where occupation personnel were located. The units can be carefully controlled and the insecticide confined to nonagricultural areas where little or no harmful effects will result. In smaller areas, DDT mists produced by exhaust-type aerosol generators on jeeps or other vehicles were used for limited area control of adult insects. These outdoor mist applications, together with an all-out program of interior DDT residual spraying of buildings, DDT treatment of screens, and limited

larviciding by crews with hand sprayers and dusters accomplished excellent protection of occupation personnel from disease-bearing insects as well as pest species. Almost no requests for airplane spraying were received and aerosol bombs were no longer considered to be the principal means available for combating flies and mosquitoes.

Cockroach control, although of little consequence during the early years of the occupation, grew in importance because of the improvement of indoor temperature and the increased food supply favoring more rapid reproduction than was possible before the buildings were used by occupation forces. Special attention was given to the training of engineer crews in roach-control procedures. DDT sprays and dusts gave reasonably good control, but the new DDT-chlordane preparation, now a standard Quartermaster item, proved much more effective than DDT alone in controlling both roaches and ants.

An interesting observation during the occupation was the complete absence of bedbug infestations in Army barracks. During the early months of the occupation, entomologists with the U. S. Army observed occasional bedbug infestations in Army housing which had formerly been occupied by the Japanese Army but subsequent applications of DDT effected complete and apparently lasting riddance of this pest. I was unable to find any bedbugs in buildings used by occupation personnel during my 3 years as entomologist in the Eighth Army Medical Section. This fact is additional evidence of the importance of the residual application of DDT as an essential part of the insect control program by and for the occupation forces.

Black flies were a minor nuisance in several areas of Japan. Specimens taken in the Kyoto area were identified as *Simulium venustum.* Satisfactory protection against this pest was obtained by using insect repellents. Extensive specific control measures were not indicated.

Other pests encountered included millipedes (*Orthomorpha gracilis*) and a species of dermaptera (*Libidula japonica*) which enter houses in large numbers during long rainy periods in the summer. On a few occasions 5 percent DDT in kerosene was used as a spray to control both these pests. Although initial kills were satisfactory, little or no residual effect was obtained against either pest.

Insect and rodent control measures effected by engineer teams were closely coordinated with entomologic surveys at major installations in the Eighth Army each season. Trained personnel were not available to make weekly or even monthly surveys in all areas, but, the malaria survey detachment was used to make seasonal surveys in areas of greatest troop concentration in southern Honshu and in Kyushu. Surveys of a more limited nature were conducted at least once each season at other major installations by entomologists making semiannual visits from Eighth Army Headquarters. The findings of all surveys were used as a guide for control operations. In 1949 additional entomologists

were available and thorough weekly surveys of mosquitoes in the Tokyo, Yokohama, and Kyoto areas were possible.

SUMMARY

During the occupation of Japan, an effective program was carried out to protect occupational personnel from insect and rodent vectors of disease. The extensive aircraft dissemination of insecticides resorted to in the early months of the occupation were largely replaced by ground-control measures. Subsequent to deactivation of most of the malaria control and survey detachments in 1946, the insect and rodent control program in military installations became a function of the post engineer. Surveys of mosquitoes and other pests conducted by the available technically trained Medical Service personnel were used as a guide for control efforts. Technical training and supervision of all phases of the program in Eighth Army units was effected as a joint function of the entomologists assigned in the medical and engineering sections of Eighth Army Headquarters. Training courses at army level and semiannual visits by entomologists to all major Eighth Army units were important phases of the program. Close coordination between post engineer crews, Civil Affairs public health officials, and Japanese civilian sanitary teams was maintained in an effort to suppress sources of infestation in Japanese civilian areas. The use of DDT residual sprays in building interiors and outdoor larviciding and adulticiding with DDT sprays and dusts using both hand and power equipment were important factors in the insect and rodent control program.

That the closest support and supervision, by Medical Service personnel, of all insect and rodent control activities relating to the health of the Armed Forces is of vital importance, was clearly demonstrated. In view of the acute shortage of Medical Service personnel with training in medical entomology which existed after the deactivation of most of the malaria survey and control detachments in 1946, and the subsequent lessened effectiveness of the arthropod-borne disease-control program, more of the currently authorized existing preventive medicine units should be used. This would result in the Medical Service having a pool of trained enlisted men and officers who could be used as a source of personnel for the staffing of this type of unit in overseas areas. The assignment of an entomologist on the staff of the surgeon of each overseas command and the staff of the surgeon of each field army and army area in the zone of the interior, would be of great value in promoting an effective preventive medicine program for the Armed Forces.

An Approach to Venereal Disease Control

Eugene F. Diamond, *Lieutenant, junior grade, MC, U. S. N.*

THE problem of venereal disease concerns the 3 areas most important to the service man: (1) his physical well-being, (2) his psychologic adjustment, and (3) his disciplinary status. The venereal diseases may involve misconduct and are poorly understood by many patients. Numerous approaches have been used in the antivenereal disease campaigns throughout the services, each with its own modicum of success. Extensive educational campaigns as to the facts of venereal disease have been promulgated and these have served their purpose well. To reinforce these factual lessons, various methods have been tried to give incentive for avoiding venereal disease to those many who were well informed of protective measures and still repeatedly exposed themselves.

One popular method now becoming antiquated was the so-called "Frankenstein approach." This consisted in showing slides or movies of grotesquely disfiguring gummata. The fear and loathing induced by this method was usually dispelled by contradictory evidence given out by someone who had been cleared up in a few short days by penicillin used for an uncomplicated case of gonorrhea.

Another frequently employed method appeals to the *esprit de corps* and points out the loss of efficiency resulting from disability. The efficacy of this method is limited by the fact that most of the infections occur in those who have no service pride and for whom the good of the service has little appeal.

In the 7th Engineer Battalion, Camp Pendleton, Calif., the venereal disease rate was not excessive. It was noted, however, that 77 percent of the venereal disease occurred in the inexperienced, teen-age group fresh from boot camp. In the main these men had been acquainted with the facts of venereal disease. They had not, however, been acquainted with the facts of sex. A fallacious assumption, frequently made, is that all men in the service are experienced and wise to the ways of the world. Investigation, however, will invariably prove that these men are no more learned than are those of a comparable civilian group. Only

12 percent had had any home sexual instruction and none of these thought their training adequate. Only 4 percent had had school training and these stated that their training had been mainly anatomic and physiologic rather than psychologic. Here we had the sad spectacle of a group of young men with no sufficient sexual training placed in a situation in which sexual stresses were most severe. Their only direction in sexual matters came from older men in the barracks, the "hash-marked sexologists" who were vocal enough so that 41 percent of those who were infected stated that their exposure resulted from indirect or direct influence from older men. Some of the popular misconceptions proposed to these men along with the rebuttals used in venereal disease lectures are presented herewith.

"Sex is an uncontrollable appetite." In the minds of most servicemen, this false conception has been built up by constant bad advice. Many men think of sexual expression as something allied to excretion. They think in terms of some imaginary cycle in which sexual humors or "feelings" are built up which must be periodically emptied in order to maintain health. This line of reasoning may appeal to an otherwise sincere man who is drawn by conscience to sexual continence and yet is duped into thinking that it is unhealthy. Education to disprove this notion in the 7th Engineer Battalion contrasted man to the lower animals. Though most lower animals have periods of heat during which the capabilities and the desire for reproduction are present, man has no such cycle (though he may imagine he does). As Voltaire said, man is the only animal who "eats when he is not hungry, drinks when he is not thirsty, and makes love in all seasons of the year." Because lower animals are given these periods of heat for their protection, man must also have been given a means to protect his physical and mental well-being. This means is his reason. Reason dictates self-control for the individual and man alone can use reason in regulating his sexual conduct.

"Sexual activity is a measurement of one's virility." There are, in any service activity, many men who would be classified as Don Juan's and who boast of their sexual achievement. These men, on psychiatric investigation, usually prove to be those most fearful of losing their virility. Plagued by morbid homosexual fears they attempt to prove their virility by promiscuity, thereby repeatedly assuring themselves of their masculinity. The influence of these men is widespread and may be combatted by an authoritative expose of the motives behind their sexual activities. If they be allowed to lead young men into unwanted experience, almost always with a prostitute, they may do irreparable damage. The experience will most probably be loathsome to the neophyte and may infect him. This may disrupt his psychologic adjustment and lead him to think of sex as a criminal outlet for feelings he does not understand.

"Sex is a modern day discovery." This is a notion that has been fostered by pseudoscientific literature now common in even pocket editions. The favorite theme of these publications is that "modern science has lifted the shrouds of superstition from sex." They owe their popularity to a thinly-veiled endorsement of sexual license, couched in pseudoscientific language. Although a greater awareness of sex is currently evident because of the application of publicity and salesmanship these things do not change the fundamental conditions underlying the psychology of sex. Most sex surveys fail to make the distinction between average and normal persons in compiling their statistics. Statistics may measure the sexual standards of the average man but the normal person cannot be so appraised. Normal sex life is that which is directed toward physical, psychologic, and moral well-being. The average man does not necessarily lead a normal sex life. Sex surveyors take polls of a sick society and get sick statistics. The individual serviceman was warned against accepting the so-called "modern" free-wheeling concept of sexual conduct as practiced by many about him.

"Sex is either the cause or the cure for all mental disease." This misconception represents sexual license as the cure and inhibition as the cause for mental disease. It is mentioned only to be condemned and is usually easily dissipated in the mind of the serviceman by an appeal to common sense.

Criticism of these popular misconceptions was abetted by an endorsement of sex in its proper marital environment as an expression of mutual love and as a means to the procreation of children.

The use of a sex education program as a supplement to the regular program of venereal disease control resulted in a reduction of infection in the 17 to 21 year age group. The percent of those treated for venereal disease who fell into this age group was reduced from 77 to 47 percent and the general incidence of infection was reduced by 25 percent over a period of 5 months.

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Adapting the Albee-Comper Table for Lateral Approach to the Femur[1]

Milton S. Thompson, *Colonel, MC, U. S. A.*

THE Albee-Comper fracture table is a standard item of equipment (2). The simple devices reported here permit this table to be used for intramedullary nailing of the femur and other operations in which the lateral decubitus position of the patient is advantageous. The patient is placed on his side with the uppermost hip flexed and the perineal post in his lap. Both feet are firmly secured with muslin bandage to the respective footplate of the traction bar of the table.

The first device is an extension perineal post to allow for traction. It can be either a slotted steel rod 1 inch in diameter and about 20 inches long (fig. 1C) which fits into the seat-plate socket or a lucite rod 1½ inches in diameter in the upper half and 1 1/8 inches in diameter in the lower half about 12 inches long (fig. 1A) which fits into the hollow plastic perineal post of the table. This substance, being transparent to x-rays, allows unobstructed roentgenograms of the upper thigh region.

The second device is an adjustable knee rest (fig. 1B) made of a crutch top fitted on a wooden post inserted into a square tube of metal and fastened to the traction bar by a U-clamp of strap iron. A sponge-rubber crutch pad may be used to provide additional padding. A similar T-shaped support was made from lucite but had no particular advantage as both the wood and lucite were radiolucent, permitting roentgenograms of the knee region. Figure 2 shows a patient in the lateral decubitus position on the fracture table. The advantages of this device are that (1) the patient is comfortable, (2) the application of traction is facilitated, (3) there is ample space for operative manipulation, and (4) there is freedom from interference with x-ray views of either end of the femur.

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(1) Brooke Army Hospital, Fort Sam Houston, Tex.
(2) Stock No. 7-099-300, Armed Services Catalog of Medical Materiel.

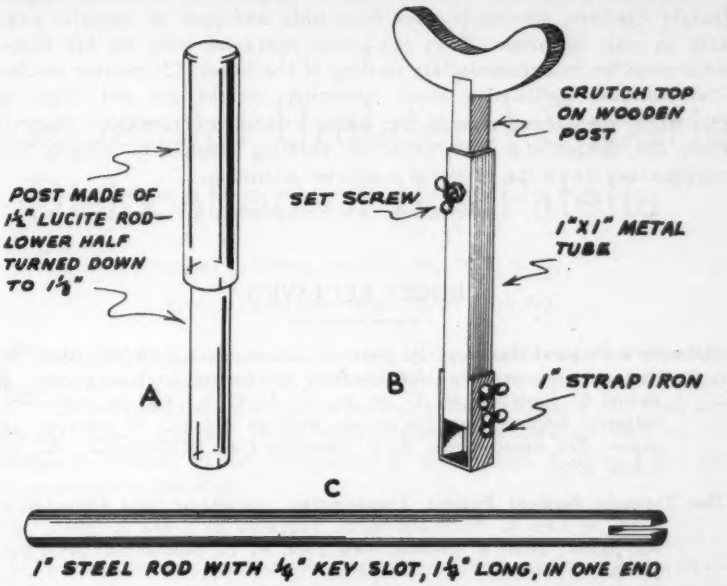
POST MADE OF 1½" LUCITE ROD— LOWER HALF TURNED DOWN TO 1⅛"
A
SET SCREW
CRUTCH TOP ON WOODEN POST
1"X1" METAL TUBE
B
1" STRAP IRON
C
1" STEEL ROD WITH ¼" KEY SLOT, 1½" LONG, IN ONE END

Figure 1.

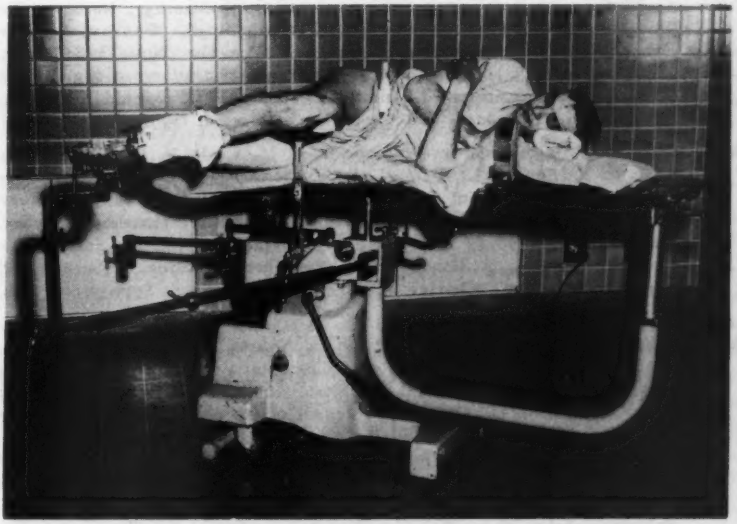

Figure 2.

These devices were created by a surgical technician, Sergeant Dwight Luckett, who made them from odds and ends of material available in most hospitals. They (1) permit operation with the hip flexed, as it must be in intramedullary nailing of the femur; (2) provide mechanical traction, facilitating many operations on the hip and thigh; and (3) allow roentgenograms to be taken without interference. They reflect the resourceful adaptation of existing equipment without cannibalization, to fit the needs of a special situation.

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Congenital Unilateral Superior Dislocation of the Patella[1]

Samuel L. Cohen, *Captain, MC, U. S. A.* [2]

Emmett B. Reilly, *Major, MC, U. S. A.* [2]

CONGENITAL superior dislocation of the patella is a rare anomaly. A careful search of the literature fails to reveal any mention of this abnormality. With the induction of large numbers of young men into the Armed Forces, many other congenital anomalies may be encountered. Because of the infrequency of this lesion, it is believed that a case report is justified.

CASE REPORT

A 23-year-old man entered the dispensary, Camp Cooke, Calif., on 21 October 1950, complaining of pain and weakness about the left knee. He gave no history of trauma to the joint. The symptoms developed while marching and performing routine military duties. He had known of an abnormality of the left knee since birth. His delivery was apparently uneventful. The physician who attended his mother told the parents that there was an abnormality of the left knee and warned them of a possible disability later on. Throughout his life he had been aware of some instability and, occasionally, pain in this joint. The left lower extremity was somewhat shorter than the right and he had worn extra lifts on his left shoe with some relief.

Physical examination showed a young man in moderately acute distress because of pain about the left knee. The patella was superiorly displaced 3 to 4 cm. The joint was moderately swollen. Manipulation revealed a slight lateral instability of the joint. A normal range of motion was present with no weakness of extension or flexion. The left and right lower extremities, measured from the anterior superior iliac spine to the external malleolus, were 36 and 37 1/8 inches long respectively. No abnormality of the right knee was noted. Anteroposterior (fig. 1) and lateral (fig. 2) roentgenograms of the left knee revealed that the patella was displaced superiorly 4 cm. from its normal position. The distal end

(1) From Specialized Medical Treatment Center, Camp Cooke, Calif.

(2) Current address: Veterans Administration Hospital, Long Beach, Calif.

of the femur appeared somewhat dislocated medially on the tibia. There was no narrowing of the joint space and no evidence of arthritic change. The anterior tibial tubercle showed no abnormality. Roentgenograms of the right knee were normal.

Figure 1.

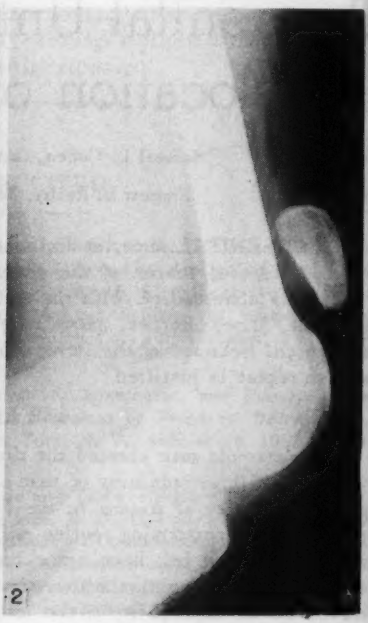

Figure 2.

The patient insisted on returning to full duty. He was loath to wear a lift on the left shoe. On 28 November 1950, while going through the obstacle course, he fell in a hole and injured his right knee. On examination, the knee was red and swollen. There was marked tenderness about the medial portion of the right knee. Knee clicks were elicited. Roentgenographic examination was negative. On conservative management he made an uneventful recovery.

DISCUSSION

The case presented is a unique example of congenital superior dislocation of the patella. It is interesting to speculate on the embryology of the patella; it is most frequently considered to be a sesamoid bone originating in the tendon of the quadriceps muscle. Possible further study is suggested in view of the case presented. In our patient, the bone, including the articular facets, appeared to be well formed. The facets are usually in relation to the condyles of the femur. There was no evidence that this relation had ever been present in this patient. There was no abnormality of the anterior tibial tubercle which would largely rule out any trauma to this area.

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